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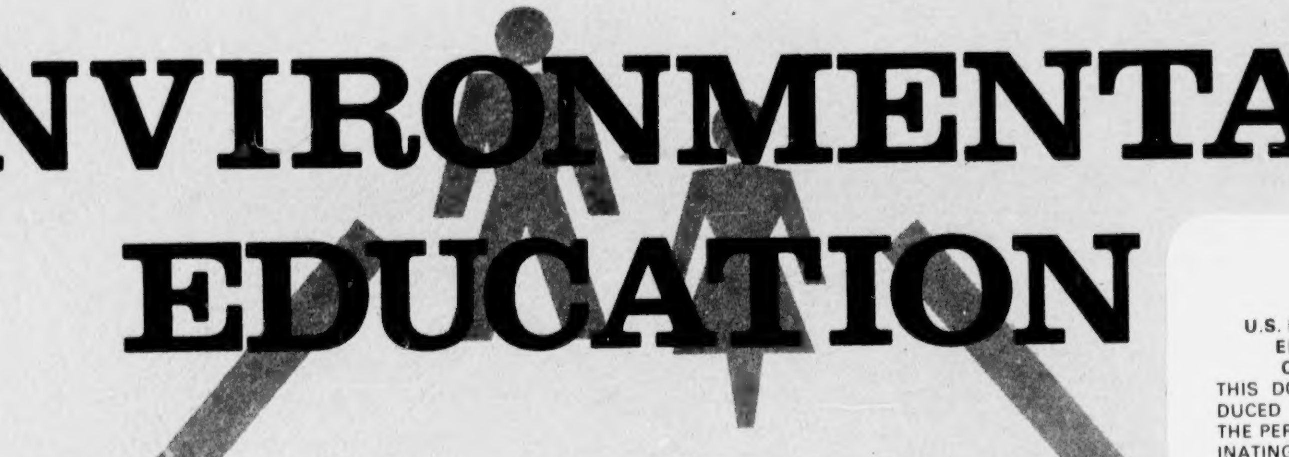
ABSTRACT

This guide is written to focus attention on both the cognitive and affective aspects of environmental education. Its format provides four levels of development: primary, intermediate, junior high, and senior high school grades, with the first two subdivided into three categories each. Performance objectives, teaching-learning inquiries, and evaluation-terminal performance are outlined within each level based on three supporting concepts. These concepts emphasize interdependence in interchange of matter and energy, in social interaction, and in cultural components and forms. Basic ideas accentuated throughout the activities are that: (1) increased population growth creates a population pressure on the carrying capacity of our ecosystem, and (2) the consumption of goods and services per capita places an increased pressure on our renewable and non-renewable resources. Topics cover land, air, water, ecology, plants and animals, environment, and population and the approaches to these topics; concepts stress awareness, concern, and action. A bibliography, agency resource list, glossary of terms, and additional teaching-learning activities are appended. (BL)



ENVIRONMENTAL EDUCATION

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A Teacher's Guide
with
Inquiry and Value Seeking Strategies

Santee School District
Santee, California 92071

ENVIRONMENTAL EDUCATION

A Teacher's Guide with Inquiry and Value Seeking Strategies

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PREFACE

For the past three years the Santee School District has sustained an interest in the area of environmental education. This is due mainly to the enthusiasm of Dr. Don Hunsaker, II, immediate past president of the Santee Board of Trustees. Through his leadership, the district sponsored a Conference on Environmental Education in May of 1970. Persons who participated in the conference, approximately 250 in number, compiled preliminary teaching units for all grade levels--kindergarten through junior college. Because of the vast amount of material submitted by these participants, the Santee School District sought a Conservation Grant from the State of California for the purpose of combining these into a teaching guide. This grant was awarded and Mrs. Julianna Hamann, a highly qualified member of the Santee School District staff, was released full-time to complete the project. She was assisted greatly in this endeavor by Mr. Rudolph J. H. Schafer, Consultant in Conservation Education with the State of California. Through Mr. Schafer, Mrs. Hamann was given access to the study entitled Ekistics, by Dr. Paul Brandwein. The major strands presented in Dr. Brandwein's publication were utilized as the structure for this teaching guide.

This guide was written to focus attention on both the cognitive and affective aspects of environmental education. When utilized in a comprehensive manner with students, this guide should lead to a change in both attitudes and actions on the part of students.

Jimmy F. Phelps, Ph.D.
Assistant Superintendent,
Curriculum Services

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INTRODUCTION

A Teacher's Guide to Ecology

by

Don Hunsaker, II, Ph.D.

INTRODUCTION

Man's concern for a pleasant existence and a high quality environment is not a new phenomenon. Air pollution, congestion in our cities and other forms of pollution have been with mankind for many, many years. Julius Caesar banned chariots from the inner forums of Rome because of traffic congestion. Krakatoa's eruption in 1883 polluted the air and caused dust fallout throughout the world.

Only recently have the complexities of mankind's activities on earth reached a point at which our environment must be protected to preserve our present way of life. Conservation of our environment becomes a concern for all mankind. It becomes a concern for the total environment, not just the various physical aspects which many of us have tried to conserve for many generations. In our efforts to maintain a pleasant environment we now have to consider all things in our lives. Thus, preserving the environment is greater than just a scientific problem, it has become one of social problems, value systems, mores and very basic decisions as to the quality of life and the life style which we desire.

This book is a composite of the efforts of many people who are concerned with the future of mankind. Our concern encouraged us to put together what we think is a basis for understanding which will enable future generations to live in harmony with their environment and with each other.

BASICS OF ECOLOGY

The word ecology is an extremely broad and all encompassing word dealing with the study of the interrelationships of living things with each other and their environment. Ecology therefore becomes a study of all living things and their physical environment. Man must be considered as only one
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unique part of the entire living system on our planet. In order to understand the study of ecology we must consider the entire planet and even the solar system as one unit. In another perspective, we might consider a classroom aquarium as a satisfactory model. An ecosystem can be as large or as small a unit as we care to examine. The basic ecological principles that are derived from the study of any one ecosystem are applicable to any other that we care to consider.

Basic to all ecological systems is the input and flow of energy. All the energy in the living systems of our planet is derived from the sun. Solar energy is radiated as light rays, both visible and invisible, which fall upon the earth. Some of the energy is reflected back into space, with a considerable amount absorbed by our atmosphere. The atmosphere removes a great amount of the ultraviolet light which would be injurious to living systems on earth. Other energy is reflected back into the atmosphere from the surface of the earth. This reflected energy is for the most part reflected in long heat waves. The important factor here is that the longer waves do not penetrate the atmosphere and as a result many of them are trapped in the gasses that envelop the world. The effect is similar to that which occurs in a greenhouse in which the air inside is considerably warmer than that outside. This is referred to as the "greenhouse effect" and is responsible for a considerable amount of the heat of our atmosphere.

As human civilization became industrialized with a tremendous increase in the burning of fossil fuels for transportation and electricity, the increase of carbon dioxide in our atmosphere produced a greenhouse effect and has contributed to a long term warming that has been observed since the industrial revolution. Paleontological evidence shows that these warming and cooling periods sometimes last thousands of years and have a great influence on the climate of the planet.

Solar energy is transformed by green plants in a process called photosynthesis in which light, carbon dioxide and water, in the presence of chlorophyl, produces sugar which is used by plants for growth and other life processes. It is important to realize that each organism uses the energy which has been transformed from solar energy. As the energy is used by one organism and then another, there is an energy loss at each step. Green plants convert about 1 per cent of solar energy under natural conditions in the field. The animals that eat these plants convert the energy to protein at about 1-3 per cent efficiency; again with a considerable amount of unused energy, since they consume only a small percentage of the food available. Mice, for instance, will eat approximately 2 per cent of the plant food available in an old field. The predators which feed on still other animals convert the energy at about 2-3 per cent efficiency but there is a tendency to use a greater percentage of available food in this step in the energy conversion. Many animals are approximately 20 per cent efficient in converting the food of the prey species into the flesh tissue of the carnivore.

Plants utilize 15 per cent of the energy in respiration. Herbivores can lose 60-70 per cent of their energy in respiration and some active carnivores will use 90-95 per cent. Throughout an ecosystem this energy flow can be as simple as the sun shining on a blade of grass which enables the grass to grow and reproduce. A mouse feeding on the grass, leaves and seeds is ultimately eaten by a hawk, or other predator. When the hawk dies the energy is recycled in the form of nutrients and we find that only a small percentage of the original energy available in the system has been transformed by the hawk.

In the northern hemisphere there is approximately 1 quarter calorie per centimeter per minute of solar energy available to living systems. This energy then is the basis for all populations of plants and animals that we see in a particular area.

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NUTRIENTS

All living organisms require specific compounds for nutrients to continue the living process. The most important elements that are required are nitrogen, phosphorus, and sulfur. These are required in relatively large amounts and are utilized, along with a variety of other elements, by the organisms. Nitrogen is reasonably common in nature, and we have seen how it can be fixed by nitrogen fixing bacteria in plants, and how it is usually available for plant growth and reproduction. Sulfur is also a reasonably common element in nature and is found in the form of sulphates in most water supplies and soils. Phosphorus, however, is not as common as nitrogen and sulfur in nature, and exists in most areas in a limited and finite amount. Most of the phosphorus that is present in the system at any given time is incorporated in the living material of the plants and animals.

There must be a continuous supply of nutrient material available for the plants and animals to utilize solar energy. Plants require carbon, hydrogen and oxygen to make up the bulk of protoplasm (living material in a cell). Phosphorus, nitrogen, sulfur and a variety of other elements are required for life to be sustained. Some of these elements are required in large amounts, while others are needed in only minute amounts to sustain the system.

Nitrogen is needed by plants and animals to sustain life. Seventy-nine per cent of the earth's atmosphere is nitrogen, but plants and animals cannot utilize atmospheric nitrogen as nutrients. The nutrients must be in a particular form combined with oxygen called nitrates. Almost all of the nitrates that are available as nutrients are formed by bacterial decomposition of dead organic matter. Carbon dioxide, on the other hand, is also necessary in living systems for photosynthesis. It is present in the atmosphere in only very small amounts as compared with nitrogen. The major difference is that carbon dioxide can be used in its free state and, as a result, plants exposed to the air have enough carbon dioxide to sustain life. A considerable amount of the carbon dioxide used by plants is a byproduct of animal respiration which again points out the dependency and complexity of the organisms in an ecosystem.

Sulfur is another element which is needed in moderate amounts and is present in the earth in the form of sulfates. This is a reasonably common compound and plants seldom have difficulty in obtaining enough sulfur from the soil they grow in. Another element necessary for life is phosphorus which must be utilized in the form of phosphates. Some phosphates are produced by decomposition of parent rocks but like nitrogen, the majority of phosphates are formed by the decomposition of organic material.

When an ecosystem depletes any one of the necessary major elements, the growth and reproduction of that system slows down. There is a biological law of "minimum" which states that of all the factors necessary for nutrition of a system, the single factor which is in the shortest supply or least quantity will limit the growth of the organism. Thus the limiting factor will be that element which is in the least supply and limits the growth of the organism or a population.

One of the problems of a large population of people is the impact our civilation has on the ecosystem. By depleting resources in one area, and overproducing nutrients in another, the basic system is disrupted. In one week, a small city can produce more phosphates and dump them in a lake than would naturally occur in several years of normal life.

An ecosystem is structured in a very complex way and consists of a group of communities which also have complex structures and are interrelated. Depending upon how large or small an ecosystem or community we want to consider, we can refer to a lake, a prairie, a forest or a desert as an ecosystem or community. These communities are relatively stable and slowly react to environmental influences. A northern hardwood forest is considerably more stable and more immune to the effects of man than is a desert community. Desert plants and animals are living in exceedingly marginal conditions to begin with, and when man or natural phenomena, which change the desert, interferes
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change the desert, interferes, it takes considerably longer for the ecosystem to recover from this damage. It is not uncommon to see manmade excavations and vehicle tracks in our deserts that are twenty to thirty years old. Similar disturbances would have long since been covered up in a tropical rainforest or a deciduous forest.

FRESH WATER LAKE

A good example of the complexities of a community of ecosystems is represented by a fresh water lake. All communities have a life history of development from one point in time to what is referred to as a climax or stable community that lasts as long as the climate does not change. The development of a climax vegetation structure goes through a series of seral stages which are easily identifiable to one who studies ecology. The sere, or seral stage, can tell us the place in the development that a particular community is in. If we start with a simple excavation in a forested area, it will soon accumulate water from rains and melting snow, forming the early stages of a fresh water lake. At first the only organisms that we find associated with the water are single cell algae which receive their energy from sunlight via photosynthesis. During the summer months when there is a lot of light and high temperatures, the algae populations will build up and form an abundant supply of food for large organisms that become established in the lake. Aquatic animals, such as insects, begin to be established by direct invasion. Other organisms like aquatic birds transport pieces of pond weed and other aquatic plants on their feet, bills and feathers. Pond weeds soon become established, first floating then later rooted species attach to the subsurface of the lake. The rooted aquatic plants such as cattails and bulrushes attract other varieties of species of animals which use this habitat for food, refuge or nesting. Floodwaters from nearby streams bring in fish. They either eat the algae or the insects associated with the algae. As more fish are present, predatory species can also establish themselves and feed on smaller fish. Floating algae and single celled organisms, referred to as plankton, form the basis of energy transfer through photosynthesis. Energy is then transferred through the consumers, smaller insects, up to the higher trophic levels, i.e., fish and aquatic vertebrates.

As the pond weeds die and settle to the bottom, and erosion of the surrounding area deposits solid material at the bottom of the pond, we find that the lake becomes progessively shallower. This hastens the establishment of more rooted aquatic plants which die and fall to the bottom, which also speeds the filling in and sedimentation of the lake. At the terminal stages in the life of a lake, a shallow marsh develops. It is characterized by small rooted terrestrial plants, water-loving trees, and rushes of the specialized type which grow in wet soil. When sedimentation and filling of the basin is almost complete, a meadow-like area is present that is the beginning of the transformation of the open land which was once a lake into the climax forest which surrounds the area. Seedlings receiving shade from surrounding small bushes and trees gradually invade the meadowland.

Thus, from a stable climax forest in which an area was cleared a lake basin was formed. A series of stages from a relatively sterile body of water to a mature lake can be seen. The conditions of rooted aquatic plants, birds, fish, amphibians and reptiles are only transitory things. The lake soon changes to a marsh and meadowland which then gives rise to the forest vegetation that was originally there.

While the lake is in its most productive period of life, it has very definite annual cycles which depend upon temperature, light, and nutrients. As was stated previously, the primary production of energy in the lake comes from the presence of single-cell plants. These planktonic organisms are free floating and incapable of locomotion. Biological activity is a function of biochemical changes which take place within the cell. Chemical changes and reactions occur at a faster rate at high temperatures than low ones. So as the temperature increases, biological activity also increases. As springtime approaches, and temperatures go up, and the day length also increases, so we are changing two important factors: warmer temperatures for increased biological activity and large amounts of light for photosynthesis. These two factors interacting cause a "bloom" of the one-celled algae.

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And so, as the populations of algae expand in the spring, they utilize all of the available phosphorus that is in the lake. As a result, the population is limited by the amount of phosphorus available to the organisms. When the phosphorus limits are reached and none is available, the population diminishes and the organisms die. These dead organisms are recycled in the environment, and the phosphorus is available to the next generation as phosphates dissolved in the water. The reduction of the plant population that is seen after the original or first bloom in the spring is usually due to the reduction in the amount of phosphorus that is available. Until recycling in the summer when phosphorus is again available, the population numbers are reduced. When the phosphorus levels build up in the lake, the population increases in the second rise. In the winter months, as temperatures begin to lower and as day length becomes shorter the population diminishes until the phosphorus reservoir can be built up and become available to the producers the following spring.

Another unique feature of lakes is the characteristic of thermal stratification and the utilization of oxygen in a dissolved state by the organisms. As the sun shines on the algae in the warm water lake, the algae, in the process of photosynthesis, manufactures oxygen which is dissolved in the water and is then utilized by fish and other aquatic organisms. In a rapidly moving stream much oxygen is absorbed by the splashing and mixing process. In a lake some oxygen is absorbed from the air-water interface. The vast majority of dissolved oxygen that is used by the lake community, is generated by the algae through photosynthesis. At night, however, when photosynthesis is not occurring, the plants derive their energy from respiration just as animals do. They in turn use oxygen and manufacture carbon dioxide in the respiration process. During most months of the year the utilization of oxygen by the animals is a well balanced system. However, in the late spring or early summer, the populations of algae can build up to such a level that the pond water oxygen system often becomes out of balance in a very short time. On a warm summer day one can literally see oxygen bubbling up through the water that is saturated with oxygen. (At night, however, the plants in the water require so much oxygen that the dissolved oxygen is depleted.) When the available oxygen is below certain limits, many of the consumers will die. This condition is referred to as a "summer fish kill" and in many cases the shores and beaches of the lakes will be literally solid with dead fish. This of course reduces the fish populations by 85-90 per cent and completely changes the community structure of the pond.

Another physical characteristic of water and lake community structures is that water is most dense at 4° C. (37° F.). As temperatures drop in the winter time, the dense water sinks to the bottom of the lake. As the cooling process continues toward zero, or freezing, ice is formed at the surface of the lake. Because of this, when the surface freezes, a lake seldom freezes solid but is almost all the same temperature. This, of course, produces a very cold environment in which there is little biological activity. However, there is still enough light penetrating the ice for the algae to manufacture oxygen and maintain adequate levels of oxygen in the water for the fish and other organisms. Only when snow covers the ice and blocks the light does the oxygen saturation fall to critical levels.

Thermal stratification which occurs in the spring is part of the annual cycle of the lakes. As the water warms up, the surface water tends to warm at a more rapid rate than the water at the bottom of the lake. Eventually, the surface water is warmed considerably more than the other water in the basin and the lake becomes stratified with an upper layer, the epilimnion, which is warm, well oxygenated and circulated due to the action of the wind. The lower part of the lake is referred to as the hypolimnion which is usually below the level of effective light penetration and as a result no photosynthesis takes place in this water. The unoxygenated water results in anaerobic decomposition. This makes
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ecomposition. This makes

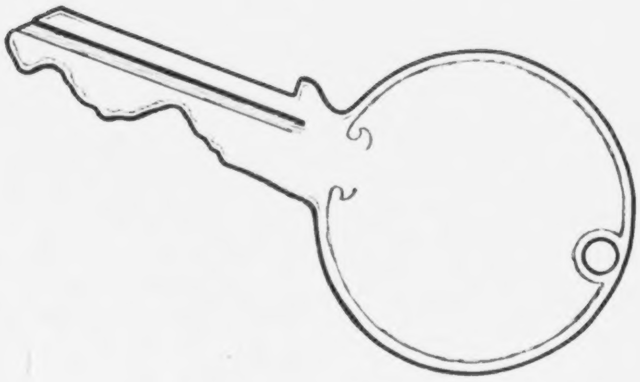
a tremendously rich area of the lake which has a lot of nutrients but is unavailable to the organisms of the upper portions.

In the area between the epilimnion and the hypolimnion, there is a thermocline in which the temperature drops very rapidly and serves as a barrier for the colder water in the lower depths of the lake to circulate with the higher depths. The anaerobic decomposition of the hypolimnion produces poisonous byproducts as well as high levels of nutrients. Water and mud that is brought up from the bottom of the lake that is thermally stratified smells like rotten eggs because of hydrogen sulfide that was produced by the decomposing bacteria. In the fall, the surface of the lake begins to cool, and when the temperatures of the epilimnion and hypolimnion are the same, the waters from the depths are mixed with the surface waters. This can also prove to be a very dangerous situation to fish and sometimes many are killed due to the toxic substances which are mixed into the water at a very rapid rate. Usually, the mixing sequence is rather slow and does not cause significant numbers of fish kills, but if a strong wind causes the water to mix rapidly, it can cause severe fish kills.

As the human use of phosphates and detergents accelerates we find that in the natural environment of the lake, phosphates are no longer a limiting factor, but are available in plentiful supply. Because of this, instead of utilizing all of the phosphates in the water and having the population reduce itself in the middle of the summer, the population continues to build until algae are present in such great numbers that the pond becomes out of balance. Fish are killed at a rapid rate due to the deoxygenation of the water, and the algae continue to be exceedingly dense throughout the year. One of the multiple problems that this causes is that it maintains the condition in which there is a tremendous preponderance of producers. As a result, this hastens the evolution of the pond, increases the amount of plant material that dies and tends to fill up the pond, increases sedimentation and in general keeps the pond in an unnatural condition. The lakes and ponds that receive sewage and other waste from cities are in very critical shape and are a real problem to maintain.

Similar effects can be observed in any other ecosystem or community that we wish to consider. The use of fertilizers, especially in agricultural areas, superimposes an unlimited supply of nitrogen, phosphorus, and sulfur on the community structure. When you buy fertilizer it usually has three-digit numbers such as 5-8-2 which tells the percentage of nitrogen, phosphorus, and sulfur contained in that particular brand. A 10-0-0 would be an ammonium compound which furnishes only nitrogen; 0-0-10 would mean that only sulfates are being supplied in this particular fertilizer. By comparing the relative amounts of these elements in the fertilizers which we use in our gardening and agricultural activities, we find there is a tremendous variation in the percentage of elements that are available in fertilizers sold for the same purpose. In many cases our soils become deficient in phosphates or nitrogen and yet we utilize a fertilizer that does not contain phosphates or nitrogen in sufficient amounts. Most of us indiscriminately apply too much fertilizer and have an overabundance of nutrients that are flushed into the gutters and lakes, causing numerous problems. The intelligent use and care of our resources becomes all important if we want to maintain our environment in a natural state.

A Key for Understanding This Guide



THE CONCEPTS AND VALUES THAT SHOULD PERVADE THE ENTIRE CURRICULUM OF THE STUDENTS.

> . . . .conservation must become a way of life with all of the students.

Ronald Reagan,
Governor of California
1970

> It is our responsibility to help youth develop an informed conservation conscience--aware of values and choices, and sensitive to the needs of generations to come. . . Because conservation involves human attitudes and policies, much of the instruction should occur in the social sciences area. The knowledge of basic ecology and resource technology essential to making wise conservation decisions should be gained through the science curriculum. . . The school program must stress personal responsibility and involvement in the work of conservation. This emphasis is essential if we are to overcome the common tendency to blame others for problems we have all had a part in creating, and which will require the efforts of all to solve.

Wilson Riles
Superintendent of Public Instruction
January 22, 1971

We would hope that each graduating student will have a thorough grounding in basic ecology, resource technology and the social sciences as they relate to resource and environmental problems upon which to base a personal conservation ethic. Decisions regarding man's use of the environment must be based on:
- -economic feasibility
- -social acceptability
- -political reality.

A report of the California State Board of Education
by the Conservation Education Advisory Committee
Rudolph J. H. Schafer, Chairman
October 1969

Concepts and values are anvils on which philosophies, policies, and practices are molded . . . a concept isolates common attributes of objects, events and behavior. Values . . . isolate common attributes of objects, events, behaviors we prize.

Paul F. Brandwein
"Ekistics" 1970

The framework used for the concepts and values of the teaching-learning inquiries was essentially from the study, designed to undergrid a curriculum in Man and his Environment by Paul F. Brandwein and his Committee on Ekistics. (1970)

The teaching-learning inquiries were compiled from ideas presented at the May, 1970 Santee Pollution Conference, from the bibliographic resources, from interested individual contributions, and from the author's past value-oriented teaching experiences.

The basic pervasive ideas stressed throughout the activities, were that the increased population growth created a population pressure on the carrying capacity of our ecosystem and that the consumption of goods and services per capita placed an increased pressure on our renewable and non-renewable resources. Our values, behaviors and attitudes then determine how close man becomes to being an endangered species.

THE STRUCTURE OF THE TEACHING PROGRAM, MATERIALS AND METHODS.

The criteria for determining the inclusion of selected teaching-learning inquiries were varied in scope and dependent upon how the inquiries met the need for an innovative, environmental curriculum. The following questions were posed:

Topic Emphasis

1. What inquiries could be included on basic ecology?
2. What inquiries could be included on conserving and preserving the present healthy conditions of the environment?
3. What inquiries could be included on restoring or redeeming the the polluted environment?
4. What inquiries would interrelate environmental issues?

Approach

1. Would the approach in the inquiry be an awareness one (to observe, locate, identify, or seek information)?
2. Would the approach be for concern--(care about what happens to individuals and group interactions)?
3. Would the approach be for action--(activities which would involve physical performance)?

Modes of Inquiry and Process of Inquiry

After reviewing the California State Board of Education framework on developing New Social Sciences Education, the following questions were asked:

1. Would the inquiry reflect an analytic mode?
2. Would the inquiry reflect the integrative mode?
3. Would the inquiry reflect the policy mode?
4. Would the process of inquiry include some observing, classifying, inferring, contrasting, comparing, generalizaing, integrating, defining and communicating?
5. Would there be examples in defining problems, valuing, gathering data, proposing solutions, testing solutions and making decisions?

Habitat

The inquiries would be pervasive and needed some examples from all habitats.

1. Would there be inquiries about land, air and water?
2. Would there be inquiries about plants and animals?
3. Would there be inquiries on population pressure?

Discipline

Would the inquiries be related to the Social Sciences, Sciences, Health and Humanities?

Skills

Would the inquiries include verbal skills, mathematic skills, and artistic skills, taking into consideration the physical and mental maturation level of children K-12?

Values

Would the value-seeking questions reflect Lasswell's categories of basic human values (needs):

affection - love, friendship, fondness, loyalty
enlightenment - knowledge, learning, understanding, information
power - decision-making, leadership, influence, authority
rectitude (responsibility) - standards or norms, fair play, honesty, justice
respect - recognition, honor, courtesy, admiration, compliment
skill - ability, capability, talent, training
wealth - goods, material possessions, performing a service
well-being - physical and mental health

The student of today is constantly bombarded with choices and with decision-making tasks which deal with erasing environmental illness and maintaining environmental health. He needs help to cope with these immense tasks. Knowledge and use of the (Rucker-Lasswell)[1] human values categories cited above will provide him with a skill to communicate his awareness, his concern and his action toward sound environmental decision-making. Knowledge and use of the valuing process (Louis Raths)[2] cited below will provide him with the skills to clarify his values toward the direction he must take for his actions.

The processes for valuing are:

Choosing:

1. freely
2. from alternatives
3. after thoughtful consideration of the consequence of each alternative

Prizing:

4. cherishing--being happy with the choice
5. willing to affirm the choice publicly

Acting:

6. doing something with the choice
7. repeatedly in some pattern of life

Training in the valuing process and the sharing and shaping of human values is essential and vital for changing values and behavior towards positive attitudes and actions in the student's total environment.

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[1] W. Ray Rucker, V. Clyde Arnspiger, and Arthur J. Brodbeck, Human Values in Education (Dubuque, Iowa: William C. Brown Book Company, 1969), pp. 88-91.

[2] Louis E. Raths, et at., Values and Teaching (Columbus, Ohio: Charles E. Merrill, 1966), p. 30.

Decision-making

1. Would the inquiry lead to a question of economic feasibility--(can we afford the solution)?
2. Would the inquiry lead to a question of social acceptability--(can we live with the solution of the problem)?
3. Would the inquiry lead to a question of political reality--(is the solution legal or made to be legal)?

The criteria were kept in mind and a selection from each category was made in order to make the inquiries balanced and reflective of the holistic view of man's environmental issues and illnesses.

The concept-seeking and value seeking questions at the end of each activity are merely a beginning line of inquiry to get the children and teacher started. Questions to be explored should come about naturally as the inquiry is evolved.

THE UTILIZATION OF THE LEVELS IN THIS GUIDE

It will be noted that this teaching guide has been developed in four levels and that the first two levels have each been sub-divided into three categories. Levels I_1, I_2, and I_3 are suggested for the primary grades; levels II_4, II_5, and II_6 are suggested for the intermediate grades. Level III has been aimed at the junior high school and Level IV at the senior high school. However, because of the newness of the area of environmental education and the fact that the inquiry and value seeking strategies become increasingly complex, the beginning levels may be utilized with older students. For this reason, the guide was divided into levels rather than grades. If the teacher should decide to begin an intermediate age class with Level I, he would need to utilize the state-adopted science books for his grade level rather than those mentioned in the guide. Otherwise, the teaching-learning inquiries should be applicable or adaptable satisfactorily.

A CURRICULAR FRAMEWORK IN EKISTICS

by Dr. Paul F. Brandwein

President, Center for the
Study of Instruction

The cognitive-affective constructs (concepts and values) which form the framework of Ekistics (human ecology or conservation of the environment) are plotted as conceptual pathways. These conceptual pathways constitute the major concepts which underlie the various levels of this guide.

COGNITIVE-AFFECTIVE CONSTRUCTS

Man is interdependent with his natural and physical environment.

Man's social behavior is basic to maintaining, altering, adapting, or destroying the environment.

Man utilizes his symbolic and oral traditions to maintain or alter the environment.

CONCEPTUAL PATHWAYS

A - Interdependence--In Interchange of Matter and Energy.

B - Interdependence--In Social Interaction.

C - Interdependence--In Cultural Components and Forms.

RESOURCE GUIDE

LEVEL I_1

A. In any environment, living things have similar needs.

B. Men live in different environments.

C. Men interact mentally and emotionally to the objects and events in their environment.

SYMBOLS

L - Land

A - Air

W - Water

EC - Ecology, Plants and Animals

EN - Environment, Population

SUPPORTING CONCEPTS

LEVEL I-1

A. In any environment, living things have similar needs.

B. Men live in different environments.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Organisms have similar needs. Through verbal interaction children recall and list the basic needs of man which is necessary to stay alive.	Brainstorm with the children and list on the chalkboard or on charts all the necessities of life which they feel are pertinent for staying alive. -What things do we need to grow? (milk, bread, etc.) -What do we breathe? (air, oxygen) -What do we need to keep warm and protected? (hats, coats, houses, furnace, etc.) -What else is necessary to stay alive? (Ec)
	Probe pupil investigations in Concepts in Science I listed below to determine essential needs for growing boys and girls. pp. 118-119 The growth of a child pp. 120-121 Investigating why food is essential pp. 122-123 Child growth as related to weight increase pp. 124-126 Differences in rate of growth pp. 104-105 Food is essential to the survival of living things pp. 96-99 The importance of water in the survival of living things -Where does food come from? -Why do we need it? -What would happen if we did not get enough to eat? -Do you know of someone who is not getting enough to eat? (Ec)
	Classify children's responses into basic categories such as water, air, land, plants and animals. -How are these essentials similar? different? -Can we put some of these needs under one label or word? (e.g. apples, spinach--PLANTS)

A. In any environment, living things have similar needs.

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C. Men interact mentally and emotionally to the objects and events in their environment.

	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
eeds. on the is	Brainstorm with the children and list on the chalkboard or on charts all the necessities of life which they feel are pertinent for staying alive. -What things do we need to grow? (milk, bread, etc.) -What do we breathe? (air, oxygen) -What do we need to keep warm and protected? (hats, coats, houses, furnace, etc.) -What else is necessary to stay alive? (Ec)	Children recall those essentials which they feel are necessary for survival. Children classify essential needs under major categories. Children demonstrate their understanding of the essentials needed for growing boys and girls by performing science investigations from data observed and learned.
	Probe pupil investigations in Concepts in Science I listed below to determine essential needs for growing boys and girls. pp. 118-119 The growth of a child pp. 120-121 Investigating why food is essential pp. 122-123 Child growth as related to weight increase pp. 124-126 Differences in rate of growth pp. 104-105 Food is essential to the survival of living things pp. 96-99 The importance of water in the survival of living things -Where does food come from? -Why do we need it? -What would happen if we did not get enough to eat? -Do you know of someone who is not getting enough to eat? (Ec)	
	Classify children's responses into basic categories such as water, air, land, plants and animals. -How are these essentials similar? different? -Can we put some of these needs under one label or word? (e.g. apples, spinach--PLANTS)	

SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Illustrate through drawings, groups of things under one category (e.g. steak, eggs, chicken, etc.--"ANIMALS"). (L-A-W-Ec)	

SUPPORTING CONCEPTS
LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
Through clarifying discussion children recall and list the basic needs of plants and animals, similar to man's need, which is necessary to stay alive.	List all the needs of plants children can recall. Refer to, or use after, activities in pupil investigations in Concepts in Science I listed below. Pupil investigations from Concepts in Science I p. 62 A single plant produces many seeds p. 63 Seeds sprout and develop into new plants pp. 64-65 Each kind of seed produces its own kind of plant pp. 68-69 Investigating mold and green plants p. 70 Investigating real plants as grasses p. 71 Seeds in common fruits p. 72 Travel of seeds to new environments p. 73 Discovering that green plants need sunlight -Can plants move about to seek food? -What happens when they are deprived of one or more needs? -Who does the depriving--man? nature? -Are the needs for plants different from man;-similar? -How does one help the other obtain their needs for survival? Cite examples from observations at home and school. (Ec) List all the needs of animals children can recall. Refer to, or use after, activities in pupil investigation in Concepts in Science I listed below. Probe pupil investigations from Concepts in Science I pp. 76-78, 80 Animals reproduce their own kind p. 79 Animals pass through a cycle of change p. 81 Animals develop through stages	Chi enc the pla on ill Chi fee int wit The

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VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
iscussion list the ts and man's ssary to	List all the needs of plants children can recall. Refer to, or use after, activities in pupil investigations in Concepts in Science I listed below. Pupil investigations from Concepts in Science I p. 62 A single plant produces many seeds p. 63 Seeds sprout and develop into new plants pp. 64-65 Each kind of seed produces its own kind of plant pp. 68-69 Investigating mold and green plants p. 70 Investigating real plants as grasses p. 71 Seeds in common fruits p. 72 Travel of seeds to new environments p. 73 Discovering that green plants need sunlight -Can plants move about to seek food? -What happens when they are deprived of one or more needs? -Who does the depriving--man? nature? -Are the needs for plants different from man;-similar? -How does one help the other obtain their needs for survival? Cite examples from observations at home and school. (Ec) List all the needs of animals children can recall. Refer to, or use after, activities in pupil investigation in Concepts in Science I listed below. Probe pupil investigations from Concepts in Science I pp. 76-78, 80 Animals reproduce their own kind p. 79 Animals pass through a cycle of change p. 81 Animals develop through stages	Children recall the differences and similarities of the need between man and plants and their dependency on each other. They give illustrations. Children illustrate their feelings about the way man interfers with or assists with animals' survival needs. They give illustrations.

SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVE	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	pp. 82-85 Mammals bear their young alive pp. 86-87 The offspring of mammals resemble their parents pp. 88-94 Investigating American wild birds, the relationship between organisms and their young Select activities which will give children opportunity to care for plants and pets. -How are the needs of animals met? -Do they depend on man for all of their needs; some of their needs? -How does man interfer with their search for survival? (traps, hunts, destroys their homes, poisons their food, etc.) -How can man help animals to satisfy their needs for survival? (Ec) Have children draw pictures for a booklet with two themes - one in which man helps and protects animals and another in which man destroys the species or makes it difficult to reproduce. Display children's ideas. (Ec)	

SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Children discover beginning ecological factors related to the properties and characteristics of water by participating in exploratory activities from their science textbooks.	Probe pupil investigations from Concepts in Science I to explain the cause and effect relationships of the water cycle. p. 40 The formation of clouds pp. 41-42 Clouds and precipitation p. 43 Clouds and rain pp. 45-46 Heat from the sun and water cycle p. 47 The relationship between the weather and water cycles p. 48 Evaporation and condensation as changes in the state of matter -What do we do with rain? -How is it stored for our needs? (watersheds, rivers, lakes, etc.) -When we destroy or pollute our storage of water what happens to our supply? (W-Ec) Illustrate drawings with the concept of the beauty of rain, the cleansing quality and the usefullness for survival needs. Illustrate scenes in which water has been polluted due to ignorance or carelessness by man's activities. (W) Probe pupil investigations in Concepts in Science I to increase knowledge about different ways rain and water assist us with daily living. pp. 100-101 Investigating how rain affects plants on the desert. pp. 102-103 Irrigating for the survival of living things. -How have plants learned to store and use water in the desert areas? -How has man learned to capture water supply and	Children the ways maximize supply. Children science i cause and of plant supply. Children careful a our use o

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	Illustrate drawings with the concept of the beauty of rain, the cleansing quality and the usefullness for survival needs. Illustrate scenes in which water has been polluted due to ignorance or carelessness by man's activities. (W)	
	Probe pupil investigations in Concepts in Science I to increase knowledge about different ways rain and water assist us with daily living. pp. 100-101 Investigating how rain affects plants on the desert. pp. 102-103 Irrigating for the survival of living things. -How have plants learned to store and use water in the desert areas? -How has man learned to capture water supply and	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	use it when and where it is most needed? (W) View films on the desert and on farm irrigation techniques. Experiment with investigations suggested in textbooks. (W)	

SUPPORTING CONCEPTS LEVEL I-1	
	A. In any environment, living things have similar needs. B. Men live in different environments. C. Men interact mentally and emotionally to the objects and events in their environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUA
Children investigate the acquisition and use of the basic needs of water to decide how essential it is to man.	Have children keep a daily record of the frequency of drinks taken individually and collectively. Keep a tally chart by the drinking area , or transfer pebbles, sticks or whatever from one jar to another as each drink is taken. -How many drinks did the class have today? -Did some of us drink more water than others? -Would we drink as much if we had to carry it in? -Are we wasting water because it is convenient? -Would we waste it if we had to go a distance to get it? -Suppose tomorrow we cut back on only half of the drinks of today (count pebbles and divide in half), how will we feel when our quota is filled. Let's try it. -Discuss the consequences when general supply of water is reduced. (W) Provide cups and water for children and allow the addition of a "pollutant" which will change its characteristics. Note to teacher: Be sure pollutants introduced are edible and safe to drink such as sugar, salt, vegetable dye, extracts, flavorings, herbs, etc.!! -Does color added to water make us feel differently about the water we drink? -Are we reluctant to try to drink water that appears polluted and that of which we know might be dangerous? -Where have we seen water in appearance like these? (W-En)	Childre tigation to the w Childre action t daily us Children pollute ronment.

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IVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Discuss what it means to have and to drink quality of water determined by odor, color and taste. Discuss the consequences when "foul" pollutants are added to our water. (W)	
	List and illustrate as many ways as possible that water can be used by a child daily. -Children can draw illustrations demonstrating their daily use of water. -They may make slogans, posters or poems related to the theme of keeping water clean and using it wisely. (W)	
	List suggestions and illustrate how to conserve water in the class and at home. (Fix leaky faucets, shut off faucet when not in use, water yard and lawn only to saturation level, etc.) (W)	

SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Children investigate the acquisition and the use of one of the basic needs, air and how essential each it is to man.	Have children tally each breath they inhale and exhale within 15 seconds, (30 seconds). Teacher can use school clock with second hand to assist them. Stand and run in place 30 seconds (60 seconds). Record the number of inhalations and exhalations for the next 15 seconds. Compare results. -Do we need to breathe air more sometimes more than others? -What would happen if we ran in dusty dry areas? Could we breathe as easily? -If we closed one nostril by pressing it how does it limit our breathing? -Has anybody ever smelled a skunk emitting odor? How did it affect your breathing? -Are there some "thing" in the air which hurts us when we breathe? (A) Blindfold some volunteers and place them 20 feet away from source of one odor (perfume, onion, vinegar, common household odors). Allow each to advance a given number of steps closer to odor until one recognizes the source of odor. -What else do we need air for besides breathing (smelling)? -How do we know what mother is cooking before we look into her pot or pan? (A) Introduce game idea by using two odors simultaneously. Record 2 points for first odor identified and 1 point

EPTS A. In any environment, living things have similar needs.

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ECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS
LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	for second odor. -Why can we not tell what is being cooked in a restaurant when we walk in? -What are some odors we like? dislike? -What does a mechanic garage smell like? (oily, gassy, etc.) -Name some other "smells" of our community. (A) Introduce a foul smelling odor and note responses. (rotten egg, decaying plant or food, etc.) -Why is one odor more pleasant or unpleasant than another? -List some odors you like and some you dislike. -Does everyone agree which odors are pleasant and which are not? -Are some harmful? -How do we feel when one of our neighbors "smells up" the backyard? (burns trash-rubber, etc.) -How does mother keep the air clean-smelling in our home? (deodorizers) -Are there other ways? (bowl of vinegar, etc.) (A) Try this at home: Cup hand over mouth and exhale breath into hand. Immediately smell the hand. Is there an odor there? Eat various foods during day such as onion, licorice, potato chips, etc. and note odor on hand. -What makes the air we exhale smell? -How do we cut down on the smell of our breath? -If air is so important to us look for ways in which we pollute the air daily. (A)	

SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Children discover beginning ecological factors related to the interdependence of plants and animals by participating in exploratory activities from their science textbooks.	Probe pupil investigations Concepts in Science I to familiarize the children with the concepts of the food chain and the dependency of plant and animal life on each other. pp. 106-109 Investigating how plants and animals interact through a food chain relationship pp. 110-113 The growth of an animal pp. 114-116 The growth of plants -Can animals live without plants directly, indirectly? -Can plants survive without animals? -If the food chain is halted near the lower end of the chain what happens to the consumer or predator on the higher level of the food chain? -What does extinct mean? Have you seen signs like that at zoos or elsewhere? -What things do we do to interfere with food chains? (pesticides, pollution, etc.) (Ec) Have children cartoon sequences in which insects eat plants, animals, (rodents, squirrels, etc.) eat insects, other animals (fox, wolf, etc.) eat lower forms of animals. Or have children make sequence murals in which a cow eats grass and people eat meat and drink milk from the cow. Illustrate mosquitos "biting" us. (Ec)	Childr their by ill the ch Childr which destro

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-1

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Children investigate the relationship of plants and animals to man as basic supplies for survival.	Hold a clarifying discussion with the children to help them clear their thoughts about how plants and animals contribute to man's survival. -What do we choose to eat? -What do others "make" us eat? -If we didn't eat, what might happen to us (illness, disease, death)? (Ec) List or draw pictures of one day's total food intake--breakfast,lunch, and dinner and snacks. Place a "P" before a food from plant sources, an "A" before a food from animal sources, and a "PA" from both sources such as "bread and butter". Note how dependent we are on food from plants and animals. -What do we eat most of, plants or animals? -Would animals live if there were no plants? -How do animals help plants? (CO_2, decaying matter to soil, etc.) (Ec) Take any item in classroom and trace back to the initial source from which those materials came. -What items came from plants? Which kinds of plants? -What items came from animal parts? -Which came from minerals? -What would we do if there were very little or no supply of those plants and animals we need? (En)	Children act i which reflect standing of th plants and ani of man's survi participating and by showin this need. Children acti evidences in t ment which ill dependent man and animals. Children crea of acquired co interdependen

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
rela- nimals for	Hold a clarifying discussion with the children to help them clear their thoughts about how plants and animals contribute to man's survival. -What do we choose to eat? -What do others "make" us eat? -If we didn't eat, what might happen to us (illness, disease, death)? (Ec)	Children act in a manner which reflects their understanding of the need for plants and animals as part of man's survival process by participating in discussions and by showing examples of this need.
	List or draw pictures of one day's total food intake--breakfast, lunch, and dinner and snacks.	Children actively seek evidences in their environment which illustrate how dependent man is on plants and animals.
	Place a "P" before a food from plant sources, an "A" before a food from animal sources, and a "PA" from both sources such as "bread and butter". Note how dependent we are on food from plants and animals. -What do we eat most of, plants or animals? -Would animals live if there were no plants? -How do animals help plants? (CO_2, decaying matter to soil, etc.) (Ec)	Children create illustrations of acquired concepts of these interdependencies.
	Take any item in classroom and trace back to the initial source from which those materials came. -What items came from plants? Which kinds of plants? -What items came from animal parts? -Which came from minerals? -What would we do if there were very little or no supply of those plants and animals we need? (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Children investigate the acquisition and use of one of the basic needs of man: land and its role for interdependence with man.	Children review and recall those investigations in their science textbooks which illustrate man's dependency on land. -How long do seeds grow and develop without soil? (i.e. lima-bean and water) -Can seeds grow in all kinds of soil? -If we spray poisons on the soil what might happen to plants? -Are there plants in our backyards or parks which show evidence of dying because soil has been washed away? Draw illustrations of examples in which soil is needed. (L)	Children obser their environm idences of how ent on land.

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Children review and recall those investigations in their science textbooks which illustrate man's dependency on land. -How long do seeds grow and develop without soil? (i.e. lima-bean and water) -Can seeds grow in all kinds of soil? -If we spray poisons on the soil what might happen to plants? -Are there plants in our backyards or parks which show evidence of dying because soil has been washed away? Draw illustrations of examples in which soil is needed. (L)	Children observe land use in their environment to find evidences of how man is dependent on land.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMI PERFO
Through observation of their environment children will itemize one or more ways in which acquistion of basic needs, for man's survival, is being threatened.	Begin searches for those things which appear to be a threat for satisfying basic needs. Start scrapbook file on pictures of polluted water, air, land, plants and animals. (En) View films on pollution - see appendix. (En) Take a walking field trip around school and community. Draw pictures of what was seen. Save pictures to compare with a future walk (a week, a month later). Compare scenes. (En) Draw pictures of polluters (child throwing trash on school ground, smoke stacks bellowing smoke in the air, people disposing of waste materials on sidewalks, gutters, etc.). -What are we seeing? -How much "pollution" is visible? -How do we feel about what we see? -Who are the polluters? (En) Have children investigate the characteristics of soil and its pollutant factors. Bring small sample of soil from home or the nearest source and label the source. Note color, coarseness, and any "foreign" matter, such as plantlife, refuse or tiny animal life. Compare differences and similarities of each sample.	Children develop ception of observa about their schoo community to thos activities which form of abuse or Children attempt and identify thos in which they pla of polluter. Children display standing of pollu threat to surviva examples or sampl hibit in classroo sions and through work.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
their ill item- n which eds, for ng	Begin searches for those things which appear to be a threat for satisfying basic needs. Start scrapbook file on pictures of polluted water, air, land, plants and animals. (En) View films on pollution - see appendix. (En) Take a walking field trip around school and community. Draw pictures of what was seen. Save pictures to compare with a future walk (a week, a month later). Compare scenes. (En) Draw pictures of polluters (child throwing trash on school ground, smoke stacks bellowing smoke in the air, people disposing of waste materials on sidewalks, gutters, etc.). -What are we seeing? -How much "pollution" is visible? -How do we feel about what we see? -Who are the polluters? (En) Have children investigate the characteristics of soil and its pollutant factors. Bring small sample of soil from home or the nearest source and label the source. Note color, coarseness, and any "foreign" matter, such as plantlife, refuse or tiny animal life. Compare differences and similarities of each sample.	Children develop their perception of observations about their school, home and community to those scenes and activities which reflect some form of abuse or pollution. Children attempt to clarify and identify those activities in which they play the role of polluter. Children display their understanding of pollution and threat to survival by the examples or samples they exhibit in classroom discussions and through their art work.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Demonstrate experiment of pouring water through very fine soil and very hard-packed soil. Note rate of flow. Introduce "pollutants" such as a layer of tin foil, layer of paper, concrete or flat rock. Note the differences. -How differently does the soil behave? -What happens to the water? -Can plants grow in polluted soil? -How do you feel when a "pollutant is dug up in your yard? -How do you feel when trash is found under the sand at the beach or in the sandbox in the park? -What can we do about it? (L-En) Allow children's sample soil to become quite dry and have them experiment with flow of water through their soil. Introduce "pollutants" to slow the flow. -What color is soil? (multi-colored) -What kinds of particles in soil are "natural" and which are "pollutants"? Illustrate examples of pollutants found in a terrarium or mural. Display evidences of land refuse (tin cans, wrappers, etc. on bulletin boards). -Is water really colorless? Why were different samples slightly different in color? (pollutants, foreign particles, etc.) -What kinds of things did we see in the water samples? -How did water move soil? -Do we have examples in our community with silt in rivers, dams or lakes?	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-What do you think might happen to fishes and water plants in muddy waters. (L-En-W) Record areas around home or city where water has eroded property and where water remains in stagnant pools. (W-L-En) Bring small samples of water from home in clear clean plastic containers and label with child's name. Place containers of water on window ledge or near source of light. Observe and note differences in color and residue. (W) Bring samples from relatives and friends who live outside of local water district and note similarities and differences. (W)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
After investigating home and community environment, children will describe and illustrate deprivation of a healthy environment.	Through sociodrama, act out behaviors of polluters in and around school. -What are they doing? -What are they saying? (En) Look for evidences of children conserving their environment. -What are they doing? -What are they saying? Illustrate or dramatize the actions. (En) Plan a large chart or bulletin board on pictures of what is happening and what should be happening as man seeks to secure his basic needs. -When children destroy their environment who are they hurting? -How are we affected when some one breaks a tree branch or pulls up flowers and bushes? -Why should we be careful with our toys? -What do we do? -What other things can we do? -Of what are we afraid? (En)	Chil tens imme poss dest Chil ings envi Chil hand acti or a heal situ

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
me and children strate hy envi-	Through sociodrama, act out behaviors of polluters in and around school. -What are they doing? -What are they saying? (En)	Children reveal their inner tensions and fears when their immediate environmental possessions are abused or destroyed.
	Look for evidences of children conserving their environment. -What are they doing? -What are they saying?	Children explore their feelings about an unhealthy environment.
	Illustrate or dramatize the actions. (En)	Children describe ways to handle their emotions and actions when angered, hurt or are fearful of an unhealthy environmental situation.
	Plan a large chart or bulletin board on pictures of what is happening and what should be happening as man seeks to secure his basic needs. -When children destroy their environment who are they hurting? -How are we affected when some one breaks a tree branch or pulls up flowers and bushes? -Why should we be careful with our toys? -What do we do? -What other things can we do? -Of what are we afraid? (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
Children will participate in activities which redeem the polluted environment at their school and home sites.	Have children periodically collect scrap and refuse from schoolyard and home environment. Note kind and frequency of refuse. -Why should we clean up our environment? -Who pays for trash collection? -Where does the trash go? -How can we cut costs? -What does foul trash do to our health? (En-L)	Chi evi ae cl ar Chi ac
	Introduce the concept of re-cycling of returnable bottles, aluminum cans and newspapers. If possible ask them to participate in local youth group projects. -Where does paper come from? (trees) -If we reuse newspapers, paper sacks and envelopes how are we helping save our trees? -If aluminum cans can not rust away we have to reuse them. How can we help collect them? -What other kinds of things that we see thrown around in our environment could we reuse or collect and recycle? (En)	
	Illustrate contrasting scenes with before and after land trash pollutants. (see bulletin board ideas) (En-L)	
	Create dioramas of a healthy city, healthy rural, healthy desert or healthy forest environment to live in. (L-En)	

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IVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVAL
Men live and survive in different environments.	Use local audio-visual listings to select and to view films on various homes, habitats or modes of shelter throughout the world. -What kinds of shelters are there? -What do we need a house for? -Where do we get houses? (En)	Child on ot their
Children identify different environments.	Have children compare and contrast homes other people choose to live in.	Child diffe and h envir
After reviewing illustrations of man-made shelters, children will select and illustrate a type or types of homes which would appeal to them to live in and to give reasons for their choice.	Illustrate pictures of homes with extreme temperatures such as igloos and jungle huts.	Child disad livin home- their
	View films on mountain forest homes and desert homes and note structure and size differences.	
	Read to the children the poem "If I could Build a House", from Ranger Rick, January 1971. See appendix about the possibilities of living in different environments of a child's choice. -Children select and illustrate their choice of home sites and state reasons for their choices. -Children may role-play "buying" home sites and ask questions about environmental conditions in the community which will determine their purchase. (En)	
	Children begin to compare various modes of living.	
	Children draw pastoral scenes of country living. Note pleasing atmospheres and reasons for desiring to live	

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in differ- ifferent ustrations , children ustrate homes o them to reasons	Use local audio-visual listings to select and to view films on various homes, habitats or modes of shelter throughout the world. -What kinds of shelters are there? -What do we need a house for? -Where do we get houses? (En) Have children compare and contrast homes other people choose to live in. Illustrate pictures of homes with extreme temperatures such as igloos and jungle huts. View films on mountain forest homes and desert homes and note structure and size differences. Read to the children the poem "If I could Build a House", from Ranger Rick, January 1971. See appendix about the possibilities of living in different environments of a child's choice. -Children select and illustrate their choice of home sites and state reasons for their choices. -Children may role-play "buying" home sites and ask questions about environmental conditions in the community which will determine their purchase. (En) Children begin to compare various modes of living. Children draw pastoral scenes of country living. Note pleasing atmospheres and reasons for desiring to live	Children focus their attention on other modes of living than their immediate environment. Children examine reasons for different kinds of structures and how it is adapted to its environment. Children weigh advantages and disadvantages of various living quarters and select a home-style consistent with their values.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION
	there. Note clouds, clear skies, running water, green meadows, etc. -Where do we play? grow food? build houses? -Why do we like or dislike country homes? (En-L) Draw pictures of suburban tract homes. Note limitations of space to play, to grow fruits and vegetables and to raise young animals. -What happened to all the yardspace for recreation and for gardening? -Where are the animals? -What kind can you raise in the suburbs? -Why do we like or dislike tract homes? (L-En) Draw pictures of city living. Note each yardspace, need for parks for recreation and markets for purchasing food for survival. -What are things one can do in the country that one can not do in the city? -What are the advantages of city living? -What kinds of animals or pets can we have in the city? -Has anyone here lived in both a large city and a small town? Tell us about it. -What kinds of plants can we grow in the big city? (trees in parks, seeds in window boxes, etc.) -What kinds of transportation problems arise in each locale? How different are they? -Why do people choose to live in one environment rather than another?	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Gather magazine and periodical pictures of crowded city life. -What do the homes look like? -How many people can live in one building? -Where are the children after school hours? -Where are the trees and plants? Discuss the feelings children in the city may have due to having to play in the street, to carry out their trash downstairs, to lack of green plant and tree life. -What kinds of chores do children have in large city buildings? -Where do they play? -How much noise can they make? -What kinds of rules on "quiet" do children have to adhere to? -Who takes care of children playing in the street? (En-L) Introduce a lesson on over crowding:-population pressure. Cooperate with a neighboring class. Allow for one day or week, children to be added to your class at the rate of 3-5 for an hour or for a day. Do not increase class supplies or furniture. Have children discuss crowdedness, lack of space, shortage of supplies, and noise density. -Ask for solutions from the children how they can manage. -How many can we let in a day to make classrooms function efficiently? -What conditions is the room left in when excess children leave? Is this land pollution?	

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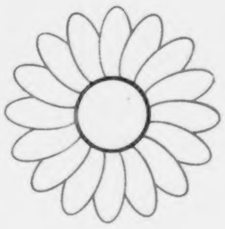
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-What kinds of behavior was observed as supplies, furniture and space was shared? -How long do we think we can share our room with others? -What kinds of feelings do we have when others take or use our supplies and equipment (land, space-classroom, recreation areas-library, toys, games, etc.) -Did we have enough water to drink and air to breathe? -Did we get all our work done, efficiently? -Did the room temperature change? -What other changes about ourselves did we notice? (L-En)	



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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Children examine building sturctures. After listing the products which may go into the building of a home, children will identify the natural resources from his environment upon which man is dependent.	Have children draw a picture of their home on the outside and also one of any room in the house. On chalkboard list all the sources from which the building materials come -(such as wood, walls, tile, brick, paint, nails, etc.) Note which materials were most frequently used and which natural resources were being tapped. -Why do we use one kind of material more than another? (Each habitat offers different resources)? -Why are wooden buildings more expensive in the desert? in the artic? -Why don't we build brick houses in the jungles? -How do we know which kind of material is better? -If more people move into our neighborhood do we need more building materials? -If our source of supply gets less what will people, who need the materials, do? (L-Ec) For a weekend activity - suggest to children that they go on a field trip with their parents to note new buildings in construction stages. Ask what else is needed to build homes besides building materials? (Men, machines, trucks, water, land, blacktop, concrete, etc.) -Is there new construction being built where we live? -What was there before? -Was it part of our daily living environment? -How will the new building sites affect us? Change our daily living patterns? -As more people with school age children move into our neighborhood what happens to our school space? our playground area? our use of equipment?	Childre product familia Childre underst cept th ral res where t work of Childre sequenc about i jects d pressur

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	For a weekend activity - suggest to children that they go on a field trip with their parents to note new buildings in construction stages. Ask what else is needed to build homes besides building materials? (Men, machines, trucks, water, land, blacktop, concrete, etc.) -Is there new construction being built where we live? -What was there before? -Was it part of our daily living environment? -How will the new building sites affect us? Change our daily living patterns? -As more people with school age children move into our neighborhood what happens to our school space? our playground area? our use of equipment?	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-Will we need more classrooms, desks, furniture, pencils and paper? -What happens to animal and plant life as we replace them with concrete and steel. (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUA
Children will sharpen their sense of awareness of beauty and aesthetic form by creating expressions of art about their meaning and interpretation of beauty in their environment.	Sing songs and read poems about the beauty of the environments in the city and rural areas. Begin patriotic songs such as "America the Beautiful". See music textbooks. (En) Have simulation activities in which father and mother decide to buy or build a new home. -What aesthetic environment will they be seeking? -What kind of construction will they be looking for? -Pretend to have small children in the family and express a need for "fun space". (L-En) Play act drama scenes of daily care and cleanliness of home and school environment. Discuss where "dirt" comes from (air, soil, highways, wind, etc.). -Who plays a role in dirtying our environment? -Whose responsibility is it to clean it up? -How do we feel about what we see? -What shall we do about our sloppy habits? (En) Create new words to known nursery rhymes and songs to demonstrate the meaning of beauty in the environment. -What does beauty mean to us? -Name some beautiful things in the environment that please you. -Are there any which recently have suffered abuse? -Let's sing our new songs and share our art products. (En)	Childre ronmen which t Childre their how to enviro Childre people their enviro

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VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
en their of beauty by creating about their etation of ironment.	Sing songs and read poems about the beauty of the environments in the city and rural areas. Begin patriotic songs such as "America the Beautiful". See music textbooks. (En) Have simulation activities in which father and mother decide to buy or build a new home. -What aesthetic environment will they be seeking? -What kind of construction will they be looking for? -Pretend to have small children in the family and express a need for "fun space". (L-En) Play act drama scenes of daily care and cleanliness of home and school environment. Discuss where "dirt" comes from (air, soil, highways, wind, etc.). -Who plays a role in dirtying our environment? -Whose responsibility is it to clean it up? -How do we feel about what we see? -What shall we do about our sloppy habits? (En) Create new words to known nursery rhymes and songs to demonstrate the meaning of beauty in the environment. -What does beauty mean to us? -Name some beautiful things in the environment that please you. -Are there any which recently have suffered abuse? -Let's sing our new songs and share our art products. (En)	Children observe their environments and note the feelings which they experience. Children make decisions about their feelings of beauty and how to express it in their environment. Children discover that some people agree and disagree on their concepts of an aesthetic environment.

SUPPORTING CONCEPTS

LEVEL I-1

A. In any environment, living things have similar needs.

B. Men live in different environments.

C. Men interact mentally and emotionally to the objects and events in their environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
As a result of exposure to the many habitats of man children will seek further information for pleasure and interest through books from the library about a selected habitat.	Children can continue probing interest in healthy pleasing aesthetic environments through library sources. Teachers can help locate books under source headings: pollution, conservation, ecology, environment. (En)	Childre ploring the way their en
	Children can write slogans, jingles, songs or to recite stories to express their feelings and edit into class booklets. (En)	Childre new expe ed from exposur
	Children decorate own stories and creative work through environmental book jackets. Display in libraries. (En)	
	Children cut and paste from discarded magazines collages to represent man's choices of seeking habitats with beauty in mind. -How can we tell others how we feel about keeping an environmental beautiful? -How can we learn more about what people elsewhere are doing for keeping their environment pleasing? (En)	

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
he n n ry	Children can continue probing interest in healthy pleasing aesthetic environments through library sources. Teachers can help locate books under source headings: pollution, conservation, ecology, environment. (En) Children can write slogans, jingles, songs or to recite stories to express their feelings and edit into class booklets. (En) Children decorate own stories and creative work through environmental book jackets. Display in libraries. (En) Children cut and paste from discarded magazines collages to represent man's choices of seeking habitats with beauty in mind. -How can we tell others how we feel about keeping an environmental beautiful? -How can we learn more about what people elsewhere are doing for keeping their environment pleasing? (En)	Children show interest in exploring to a greater detail the ways others interact with their environment. Children desire to share the new experience and ideas gained from their knowledge and exposure to the environment.

NOTES

LEVEL I_2

A. There are a variety of environments, each with characteristic features and life.

B. Men develop different modes of adaptation to life in different environments.

C. Men seek out objects, events and behaviors symbolic of beauty.

SYMBOLS

L-Land

A-Air

W-Water

EC-Ecology, Plants and Animals

EN-Environment, Population

SUPPORTING CONCEPTS

LEVEL I-2

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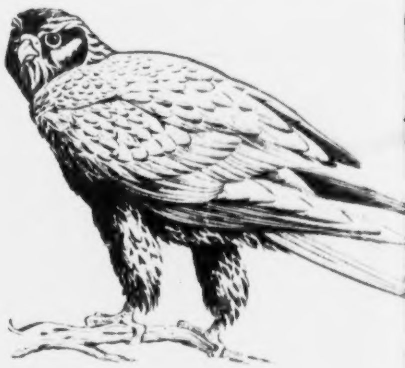
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Organisms are part of ecosystems. Children probe into the basic knowledge of ecology and ecosystems, and discover and use ecological vocabulary.	Introduce and record on charts or booklets as each term is introduced, vocabulary related to basic ecology (see glossary for definitions). (Ec)	Children s developin vocabular Ecology. Children s understand they begi context an



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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
asic and	Introduce and record on charts or booklets as each term is introduced, vocabulary related to basic ecology (see glossary for definitions). (Ec)	Children show interest in developing new and specific vocabulary dealing with Ecology. Children show evidence of understanding of words as they begin using it in correct context and form.

SUPPORTING CONCEPTS

LEVEL I-2

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Children seek through science probes to find and to identify sources of energy, to learn how these energies are stored as natural resources and to discover how we utilize them.	Probe Pupil Investigations from Concepts in Science II for energy concepts on the fossil fuels, coal, oil and gas. See pp. 26-27 Green plants use and store the sun's energy pp. 28-29 Energy from fuels pp. 30-31 Story of a piece of coal pp. 32-35 Story of a drop of oil pp. 36-37 Story of a bubble of gas -How did the fossil fuels get into the ground? -How can we make them do work for us? -What things around our homes use these fuels? -Are there evidences (signs) which show we are wasting them? -Has anyone ever been to a coal mine, gas and electric company, or an oil field? If not try to find audio-visual materials which give the children a vicarious experience with obtaining fossil fuels. (Ec)	Childre ency on frequent our dail Children apprecia role in Children which we supply a sumption Children between
	Cooperate with school custodian in observing and discussing how the school plant is heated. Note which fossil fuels are used (coal, gas, oil).	
	Record data on cost of fuel, where school gets supply, how frequently and results of fuel's effectiveness?	
	Note whether fuel is used for other purposes besides heating.	
	Illustrate through art collages how fuel residue is released (smokestacks, vents, etc.). (En)	

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
science identify learn how ored as to dis- them.	Probe Pupil Investigations from Concepts in Science II for energy concepts on the fossil fuels, coal, oil and gas. See pp. 26-27 Green plants use and store the sun's energy pp. 28-29 Energy from fuels pp. 30-31 Story of a piece of coal pp. 32-35 Story of a drop of oil pp. 36-37 Story of a bubble of gas -How did the fossil fuels get into the ground? -How can we make them do work for us? -What things around our homes use these fuels? -Are there evidences (signs) which show we are wasting them? -Has anyone ever been to a coal mine, gas and electric company, or an oil field? If not try to find audio-visual materials which give the children a vicarious experience with obtaining fossil fuels. (Ec)	Children discover the dependency on fossil fuels and how frequently they are used in our daily living. Children display a sense of appreciation for nature's role in creating fossil fuels. Children suggest methods by which we can conserve our supply and reduce fuel consumption. Children see relationships between fuels and air pollution.
	Cooperate with school custodian in observing and discussing how the school plant is heated. Note which fossil fuels are used (coal, gas, oil).	
	Record data on cost of fuel, where school gets supply, how frequently and results of fuel's effectiveness?	
	Note whether fuel is used for other purposes besides heating.	
	Illustrate through art collages how fuel residue is released (smokestacks, vents, etc.). (En)	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Observe and record how children's homes are heated; how business and industry use fossil fuels; how farms, forests and deserts use fossil fuels. -Which fossil fuel is used most often? -How do we get it into the buildings? -Which costs more? -How much do we use? (En) Set up mathematical activities dealing with purchase of fuels, cost, transportation, etc. Simulate grocery store shopping. "Buy" fuel for outdoor barbeque or other suggested activities. Keep record of purchase, costs, how fuel was transported to the home, etc. -Where did we go to get our fuel? -What did it cost? -How did we transport it? -What other fuels did we use in our transportation? (En) Have children relate the importance of the automoble, the advantages, and the disadvantages the fuels it uses, and its relationship to air pollution. -Why is it important for us to know in how many ways we use fossil fuels? -If we know it takes a very long time to develop them, how can we prevent our using it all up in our lifetime? -How can we save our fossil fuels and use them wisely? -What goes into the air as the fuel burns (unburned fuel particles and sulphur oxide, etc.)? -Are the newer cars doing a better job of controlling smog and of burning more of the fuel?	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-Could we walk or ride bicycles to close places instead of using the car? Where? -Can we share rides with others? -Do we have bus or train service? -What other ways can we cut down on using fossil fuels in cars? (A-En)	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Through study and investigation of science textbooks children discover that light is a form of energy and it can be gotten through combustion, electricity or direct sunlight.	Probe pupil investigations from Concepts in Science II to discover that light is a form of energy. See pp. 58-59 Light from combustion pp. 60-63 Light from electricity pp. 64-66 Light from the sun pp. 67-69 How light travels pp. 70-72 Reflection of light p. 73 The eye as the organ of sight pp. 74-75 Colors in light -What happens on a thick, cloudy day when sunlight cannot be seen? -How does it affect your feelings? How does it affect the temperature? -Do you know of large cities where smog covers up the sunlight? -How would our evening habits change if there were not light from electricity, candles or other form of light producers? -Why is it important to know where our light comes from? -What would happen to us if there were no light? (Ec)	Children show light and dark activities whi formed in each Children show their dependen during their e Children imagi like to be in work.

S

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IVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
investiga- xtbooks that light y and it ugh com- ty or	Probe pupil investigations from Concepts in Science II to discover that light is a form of energy. See pp. 58-59 Light from combustion pp. 60-63 Light from electricity pp. 64-66 Light from the sun pp. 67-69 How light travels pp. 70-72 Reflection of light p. 73 The eye as the organ of sight pp. 74-75 Colors in light -What happens on a thick, cloudy day when sunlight cannot be seen? -How does it affect your feelings? How does it affect the temperature? -Do you know of large cities where smog covers up the sunlight? -How would our evening habits change if there were not light from electricity, candles or other form of light producers? -Why is it important to know where our light comes from? -What would happen to us if there were no light? (Ec)	Children show awareness for light and dark and those activities which can be performed in each dimension. Children show awareness on their dependency for light during their evening hours. Children imagine what it is like to be in a lightless work.

SUPPORTING CONCEPTS

LEVEL I-2

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Children will increase their understanding of varied environments through intense study of certain habitats of plant life.	Probe pupil investigations from Concepts in Science II to discover the characteristics which enable certain plants to live in different habitats. See pp. 166-167 Fresh water plants pp. 168-169 Desert plants pp. 170-171 Plants of the moist woodlands pp. 172-173 Ocean plants pp. 174-175 Land plants pp. 176-177 Algae pp. 178-179 Fungi and lichens pp. 180-181 Mosses and ferns pp. 182-183 Seed plants p. 184 Trees -What happens to plant life when we remove it from its natural habitat? -Can we move from our natural habitat and survive? -Can we grow any kinds of plants anywhere? -Can some plants grow without our help? -What does carrying capacity have to do with plant ecology? (See glossary). -What is an ecosystem? (Ec)	Childr for a and th in thei Childr underst edness through

NCEPTS

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
increase their of varied envi- ugh intense study abitats of plant	Probe pupil investigations from Concepts in Science II to discover the characteristics which enable certain plants to live in different habitats. See pp. 166-167 Fresh water plants pp. 168-169 Desert plants pp. 170-171 Plants of the moist woodlands pp. 172-173 Ocean plants pp. 174-175 Land plants pp. 176-177 Algae pp. 178-179 Fungi and lichens pp. 180-181 Mosses and ferns pp. 182-183 Seed plants p. 184 Trees -What happens to plant life when we remove it from its natural habitat? -Can we move from our natural habitat and survive? -Can we grow any kinds of plants anywhere? -Can some plants grow without our help? -What does carrying capacity have to do with plant ecology? (See glossary). -What is an ecosystem? (Ec)	Children show appreciation for a variety of plant life and their ability to adapt in their environment. Children develop increased understanding of interrelatedness of man and plants through plant investigations.

SUPPORTING CONCEPTS

LEVEL I-2

A. There are a variety of environments, each with characteristi
features and life.

B. Men develop different modes of adaptation to life in differen
environments.

C. Men seek out objects, events and behaviors symbolic of beaut

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
As children probe into the interrelationship between man and plant life, they will begin an appreciation for a dependence on green plants.	Probe pupil investigations from Concepts in Science II to gain information on the basic life cycles of a plant and its various functions. See pp. 78-79 Investigating grass plants pp. 80-81 Seeds of different kinds of plants pp. 82-84 Plants live and grow pp. 85-90 Parts of plants and their functions pp. 91-93 The growth of a tree pp. 94-95 Food from plants Have children list or illustrate those parts of plants with which they come in daily contact (food, etc.). -Have children illustrate some of their science investigations. Display it or put it into booklets. What does a life cycle mean? -What kinds of plants do we eat daily? Whole plant or part? -Can we live without plants? (Ec) Construct models of various landforms to demonstrate how plants adapt to their environment. (See textbooks). (Ec)	Chi tra cyc Chi whi are Chi cia of

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
the en man ll be- a nts.	Probe pupil investigations from Concepts in Science II to gain information on the basic life cycles of a plant and its various functions. See pp. 78-79 Investigating grass plants pp. 80-81 Seeds of different kinds of plants pp. 82-84 Plants live and grow pp. 85-90 Parts of plants and their functions pp. 91-93 The growth of a tree pp. 94-95 Food from plants Have children list or illustrate those parts of plants with which they come in daily contact (food, etc.). -Have children illustrate some of their science investigations. Display it or put it into booklets. What does a life cycle mean? -What kinds of plants do we eat daily? Whole plant or part? -Can we live without plants? (Ec) Construct models of various landforms to demonstrate how plants adapt to their environment. (See textbooks). (Ec)	Children describe and illustrate the meaning of a life cycle of a plant. Children isolate those plants which are edible and which are not. Children discover and appreciate the plant food habits of other children.

SUPPORTING CONCEPTS

LEVEL I-2

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Children will seek information to conceptualize adaptation to environment. Through textbook probes and films they will learn how some animals adapted and survived while others became extinct.	Probe pupil investigations from Concepts in Science II to discover how some animals adapted to their environment through the ages and survived while other became extinct. See pp. 150-151 Plants and animals of the coal age pp. 152-155 Before the coal age pp. 156-157 Plants of the coal age pp. 158-163 Animals of the coal age -What is a habitat? (see glossary) -What is a limiting factor? -What limiting factors in the environment caused the extinction in some species of animals? (Ec) Visit local zoo and/or museum to note placards which indicate that some animals will become extinct while others are still in danger (endangered specials). -What limiting factors are animals faced with today? (Man's abuse of environment such as indiscriminate use of pesticides, clearing the lands for housing development and thus destroying animal homes and ecosystems, etc.). (Ec-En) Show film and pictures of pelicans or other wildlife and analyze the problems which lead to their extinction. -What kinds of animals survived from the old ages (some reptiles and cockroaches) -Some animals live in hot and some live in cold climates. What would happen if the artic got real warm and the jungles became real cold? (Man tampers with temperature changes by use of atomic inventions) -Can man live in both hot and cold climates?	Childre animals extreme climate tropica Childre adapt mo environ knowled heating wearing Childre discove ing ani and thu extinct

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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isit local zoo and/or museum to note placards which ndicate that some animals will become extinct while thers are still in danger (endangered specials). -What limiting factors are animals faced with today? (Man's abuse of environment such as indiscriminate use of pesticides, clearing the lands for housing development and thus destroying animal homes and ecosystems, etc.). (Ec-En)	Children seek information to discover whether man is altering animals natural habitats and thus creating a potential extinction risk.
how film and pictures of pelicans or other wildlife and nalyze the problems which lead to their extinction. -What kinds of animals survived from the old ages (some reptiles and cockroaches) -Some animals live in hot and some live in cold climates. What would happen if the artic got real warm and the jungles became real cold? (Man tampers with temperature changes by use of atomic inventions) -Can man live in both hot and cold climates?	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-How do we adapt? Illustrate man adapting to his environment (clothes, shelter). (Ec-En)	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Through investigations children learn to observe and record incidents of food chains and its meanings for the balance of nature. They investigate interferences with food chains and the limiting factors of the ecosystem.	Probe pupil investigations from Concepts in Science II to prove that animals depend on green plants for food directly or indirectly. See pp. 98-99 Food chain of the sea pp. 100-103 Food for your breakfast pp. 104-107 Various animals and the foods they eat pp. 108-109 Oysters and how they grow pp. 110-111 Oysters and their enemies pp. 112-113 Earthworms and their value to man pp. 116-117 Food for all -Can we illustrate some of our investigations and the concepts we have learned? -How do we depend on earthworms? oysters? (Ec) Begin a study on a body of water, either ocean, river, pond, lake or stream (depending on where a child lives). Have children observe and discuss what goes into a habitat (plants, animals, food, air, etc.). Note evidences of dependencies of life forms on each other. Have children view films which illustrate life in a lake (pond, river, etc.). -What examples of food chains did we observe? -What did the fish eat? -How do we add to its food chain when we dangle a worm at the end of a pole in front of him? -How does he become part of our food chain if we catch the fish? List all life forms observed in the body of water studied. (W-Ec)	Children conc food chain cy trating invest their science Children make specific inci experiences i observed brea the food chai Children shar riences which to action to spraying.

NCEPTS

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
tigations chil- o observe and re- s of food chains ngs for the bal- e. They inves- erences with nd the limiting e ecosystem.	Probe pupil investigations from Concepts in Science II to prove that animals depend on green plants for food directly or indirectly. See pp. 98-99 Food chain of the sea pp. 100-103 Food for your breakfast pp. 104-107 Various animals and the foods they eat pp. 108-109 Oysters and how they grow pp. 110-111 Oysters and their enemies pp. 112-113 Earthworms and their value to man pp. 116-117 Food for all -Can we illustrate some of our investigations and the concepts we have learned? -How do we depend on earthworms? oysters? (Ec) Begin a study on a body of water, either ocean, river, pond, lake or stream (depending on where a child lives). Have children observe and discuss what goes into a habitat (plants, animals, food, air, etc.). Note evidences of dependencies of life forms on each other. Have children view films which illustrate life in a lake (pond, river, etc.). -What examples of food chains did we observe? -What did the fish eat? -How do we add to its food chain when we dangle a worm at the end of a pole in front of him? -How does he become part of our food chain if we catch the fish? List all life forms observed in the body of water studied. (W-Ec)	Children conceptualize the food chain cycle by illustrating investigations from their science textbooks. Children make references to specific incidences in their experiences in which they observed breaking a link in the food chain. Children share those experiences which reveal a call to action to indiscriminate spraying.

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Set up an aquarium in the classroom and/or home. Start with fresh water (settle for 24 hours) and sandy soil. Introduce water plants and finally add fish and snails, one day apart. See textbooks for the many suggestions for food chain observations. -How "real" is this synthetic environment? -How long will life continue in a fishbowl? -How is life dependent in the bowl on us? (changing the water, aeriating the water, adding aqua plants). (W-Ec) Begin study on a selected landscape. "Fingerprint" a marked off piece of ground on the playground or wherever a child can find to observe and study plant and animal life. -What various kinds of plant life-grass, flower, shrub, tree, etc. do we observe? -What animal life (bee, spider, ant, bird, etc.) do we see? -What difference in topography, elevation, erosion, litter or unusual phenomena can we observe? -What evidences of pollution can we observe? Draw and illustrate "The Fingerprint". Compare one week or one month later. -Note observable changes (browned grass, flowers blooming, dry leaves, etc.). -What abuses are evident? -What new growth and care of area is visible? (L-En) "Fingerprint" places elsewhere after school or on weekends at friends and relatives homes or city area.	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-Do we "see" more than we did before when we are asked to look for a specific thing? -How can we tell others about what we observed? -Are we able to see the entire food chain in action? -What is hidden from our view? (L-En) Introduce the idea of interference of the food chain through the utilization of pesticides. -When is a pest a pest? -When we spray to eliminate the aphids from plants are we harming the ladybug beetle too? How? -What would happen to the unwanted pest population if we eliminated some of natures' natural "pest control" insects? -What would happen to our food chain? -Draw a picture of a link of chains with one link missing. (L-Ec) Discuss herbicides and our need to keep "weeds" from taking over planted crops. -How are earthworms affected by herbicides? -When we spray to get rid of unwanted plants (weeds) in our yards or gardens or farms what are we doing to all the small animals in the soil? -How are we breaking the food chain? Socio-drama - create short sketches in which children take part as earthworms or small animals being sprayed. (L-Ec)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVAL
Through simple experiments, children develop the ability to comprehend cause and affects of natural and physical geological erosions.	Experiment with soil erosion. On the playground, find two slopes of land-one with plant covering and one with barren soil. Using one quart of water pour gently from a sprinkling can on each slopes separately. -Note the flow of water and where it goes on each plot of land. -What is happening with the water and with the soil? -If no playground area is available in the classroom: Use two non-leaky tubs or boxes which have a V-nick or opening at one end. Fill one box or tub with sod or portion of lawn and fill the other with soil. Repeat sprinkling as above but tilt the boxes to get a slope. Have a catch basin available so that children can observe erosion taking place. -Where does the water come from? -Where does the soil go? -Why does one piece of ground have plant life on it and another does not? -Did man create barren soils? where? how? (L) Find examples of soil erosion at school site, home or community. Observe eroded areas after light rains and heavy rains. -What holds water in soil with plants? (roots and capillary action of water) -What happens to water when we allow grass to die on our lawns or we step and trample on green plants in fields? -What happens when trees are cut out from forests and the land is left barren? -If a farmer doesn't practice contour farming (rows follow contour of land) where does the water wash	Chil ural to t wind, phen Chil alte meet plac in e Chil for whic to b ly t lems Chil plan

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Experiment with soil erosion. On the playground, find two slopes of land-one with plant covering and one with barren soil. Using one quart of water pour gently from a sprinkling can on each slopes separately. -Note the flow of water and where it goes on each plot of land. -What is happening with the water and with the soil? -If no playground area is available in the classroom: Use two non-leaky tubs or boxes which have a V-nick or opening at one end. Fill one box or tub with sod or portion of lawn and fill the other with soil. Repeat sprinkling as above but tilt the boxes to get a slope. Have a catch basin available so that children can observe erosion taking place. -Where does the water come from? -Where does the soil go? -Why does one piece of ground have plant life on it and another does not? -Did man create barren soils? where? how? (L) Find examples of soil erosion at school site, home or community. Observe eroded areas after light rains and heavy rains. -What holds water in soil with plants? (roots and capillary action of water) -What happens to water when we allow grass to die on our lawns or we step and trample on green plants in fields? -What happens when trees are cut out from forests and the land is left barren? -If a farmer doesn't practice contour farming (rows follow contour of land) where does the water wash	Children discover that natural erosions take place due to the natural forces of wind, rain, and other related phenomena. Children discover that man alters his environment to meet his needs and at times places a significant role in eroding soil. Children question the need for gratifying our wants which causes so many trees to be destroyed and ultimately to lead to erosion problems. Children seek conservation plans for use of paper.

SUPPORTING CONCEPTS	A.	There are a variety of environments, each with characteristic features and life.
LEVEL I-2	B.	Men develop different modes of adaptation to life in different environments.
	C.	Men seek out objects, events and behaviors symbolic of beauty.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	away the soil? -Examine rivers or streams nearby to detect "silt"-soil washed away from farms, barren fields and forests. -What happens to soil when it is covered and uncovered when it rains? (L-En) Examine pictures and films of deforestation. Note examples of erosion. Explain the meaning of loss of needed watersheds for storing needed water supplies for later use. -Why did we cut down the trees in the forest? -Why do we have to cut so many? (for example 17 trees 35-40 years old equals one Sunday edition of Los Angeles Times). -The more trees we cut down the greater the potential of erosion. How can we cut the need for so many trees? (L-En) Each time we buy a newspaper or use an article made of paper, more trees have to be destroyed. Explore with children the idea of recycling paper goods. Have children make suggestions for reuse or recycle or paper goods (collect newspaper, shop with reused paper sacks, etc.). (En) Set up conservation standards for classroom uses of paper. -How can we use our paper to its maximum? -What other uses can we make of used paper? -Where will we locate paper to be re-used? -Who will be in charge? (En)	

SUPPORTING CONCEPTS

LEVEL I-2

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features and life.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
As a result of collecting and reading articles from magazines and newspapers, children begin speculation of consequences when green plants are limited or polluted.	Start, on a large chart or a bulletin board, a collection of articles and pictures which depict how man is abusing green plants. Note whether locale of article is nearby and suggest children take field trips with parents and friends to "report" through their eyes what is happening, who is causing it, what alternatives might be chosen for its elimination etc. Set up article reporters to sort file and exhibit findings. (En)

EPTS

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ECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-2

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Men have different customs and norms of behavior in different environments. After viewing audio-visual materials on children's customs and ways of living, the students recall those events and objects which appear to be important for most children.	Have children view motion pictures, from the local school district depository of how children live in other lands. Be expecially alert to clothes, housing, customs and habits and daily living. -How does man adapt to weather, climate and topography? -How does man seek his food clothing and shelter? -How does he borrow and use natural resources from his environment to sustain life? Have children depict scenes and activities which reflect the gathering of food supplies, the building of shelters and the customs of thanksgivings. (En) Have children select to recreate, draw or model in clay one particular facet of daily living (e.g. getting water: dam, well, faucet, etc.) which reflect custom rather than need. (En) Compare man's adaptability to living anywhere in the world with a polar bear's adaptability to live only in cold climates and a camel's adaptibility to living in warm dry climates. -Why can we adapt while animals do not? -How do we help the zoo animals such as penguins, camels, etc. adapt to our local climate? If possible visit zoo for further study of adaptations. (En)

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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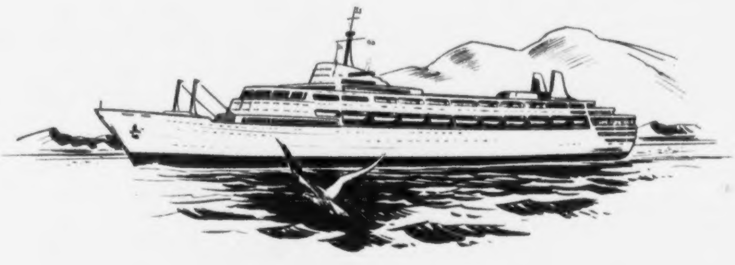
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Through discussion, children suggest ways in which the natural resources in the environment enhance the customs and norms of different peoples.	Examine social science textbooks and resource books which illustrate customs and habits of different groups of people living in different habitats using natural resources of soil, water, air, fossil fuels, woodland and wildlife. -Which resources are mainly used for daily living? -What evidences of misuse of resources do we see? -How does the availability of resources alter or enhance customs? Have children note the kinds of games children play and what resources are used. (En)	Children gain appreciation for the inventiveness of people in other lands for developing those games and activities which make life pleasant and relaxing.



SUPPORTING CONCEPTS

LEVEL I-2

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	E
Through observation of urban living children learn how man modifies his natural environment in order to improve his way of living.	Children observe and record construction of new building sites. For health and comfort observe the kinds of building materials he uses, the heating and air conditioning units and the design and function of rooflines. Have children illustrate their findings and classify them according to residential, business, industrial or recreational. Bind into class booklet. (En)	Ch pe of on th Ch de le cl re se th
	Have children observe how man obtains water for his needs for irrigation, industry, home and recreational use. Contrast the method in different habitats such as desert, forest, seashore, urban and rural settings. -Does life appear harder in the city or in the country? -Are living problems in the city different than those of country living? -What ways does man have to change to adapt to city environments if he should move from the country? -Do we move our residence about frequently? -How many of us have moved in the last year? How often? From where to where? -What changes were hardest to make? -What new advantages do you enjoy over another way of living? (En)	

ONCEPTS

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-2

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C. Men seek out objects, events and behaviors symbolic of

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
People prefer and select objects symbolic of beauty.	Have children select plants to display in classroom or at home which will add aesthetically to the room environment. (En)
Children gather information about their own habits and customs and display through a multimedia approach, the alternatives they have in selection of natural resources in order to enhance or perpetuate the dignity of their customs and norms of behavior.	Have children create art prints, posters, collages and mosaics, which use plant, seed or rock and which they will have the opportunity to select and to display as room environment. (En)
	Develop pride for room care by creating room standards for cleanliness, rules for refuse disposal and in general a responsibility for given portions of time to be chairman. (En)

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G	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Man reflects his feelings about beauty through his behavior. Through observation of their immediate environment, children begin to support those activities which create a healthy and clean environment aesthetically.	Have children inspect playground and buildings and decie upon the merits of beauty related to area. -Do we like what we see? -Do we wish to make changes? -What can be done economically, legally and within the rules of the schoolground and buildings? -How can we make sure other children will become aware of all the unique beauty of our environment? -How can we involve them to protect and preserve its beauty? -How can we show others what might happen if none of us cared about what our immediate environment looked like? (En)	Childr behavi by rea selves others ties, mote a aesthe

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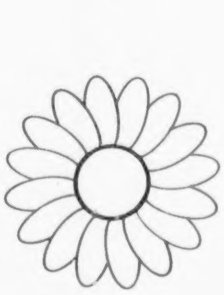
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Through clarification responses, children learn to distinguish and make selections among alternatives of behavior toward an aesthetic environment.	As opportunity arises teach the children the valuing process. Use the environment as a vehicle. Observe a given situation (an eroded playground or a broken limb of a tree or a marred building, etc.) -Was this phenomena our choice? -Were there other alternatives available? -What consequences would each alternative result in? -Are we pleased with this choice (or situation)? -Are we willing to show pride about this? -Will we do something about this choice? -Will we continue making this choice? -Can we accept responsibility for our decisions? (En-L)	Children develop the skill of the valuing process by putting to use the various clarifying questions which lead to acts of decision-making and for accepting responsibility for their decisions.



LEVEL I_3

A. Life and environment interchange matter and energy.

B. Men utilize the environment to secure their needs.

C. Men, responding to special environments, create objects and events symbolic of their interaction.

SYMBOLS

L-Land	A-Air	W-Water	EC-Ecology, Plants and Animals	EN-Environment, Population

SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
All animals depend upon plants directly or indirectly for food and energy. Through activities involving investigation of plant and animal food needs, children will be able to comprehend and describe the meaning of food chains.	Probe personal investigations in Concept in Science IV to develop generalizations that living things grow and develop in different environments and that plants and animals depend on food chains for survival. See pp. 246-249 Life in a pond p. 250 Food in a pond pp. 250-253 Life in the seas today pp. 254-256 Animals of the icy seas p. 257 Animals of the warm seas p. 261 Life in the seas long, long ago pp. 262-264 The age of invertebrates pp. 265-269 Life on land pp. 270-273 Grasslands in Africa p. 274 Forests, animals and people pp. 275-277 Deserts pp. 278-282 Cities Encourage children to develop responsibility to protect their environment through continued exploration of inter-dependence of living things and the balance of nature. -What are we doing to learn more about how our environment operates? -What are we doing to apply the basic facts of ecology which we discover in our textbooks? (Ec) Have children title three separate charts with headings: Producers, Consumers and Decomposers on which they will gather and record data on observation of food chains. On producer chart record scenes representing trees, grass and green plants which manufacture their own food and which use the energy of light from the sun and	Child edge a eviden report perime books. Child nology quence ducers decomp Child in sam action enviro Child change select consum plicat Child choice ducing throug from r cals. Child ronmer in his

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SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUA
	the marerials from soil and water. -How do plants get food for themselves? -Where do they store their energy? -What is chlorophyll? photosynthesis? -What happens when plants can't receive a normal amount of sunshine? (Ec) On consumer chart depict scenes of how leaves seed and other parts of plants are eaten by herbivores (plant eater). Also depict two-step carnivores (meat eaters) who eat the animal which feeds upon the plant. Finally include man and other omnivores (plant and animal eaters) eating both animals and plants. -Who eat plants? -Classify parts of plants in groups which are edible (seeds, roots, stalk, flower, leaves). -What happens when there are too many consumers and not enough plant life to eat? -What happens to consumers when plants through pestilence, drought or disease are limited? -How does man decide which plants he will choose to eat, (artichoke or peas)? -How does man's choice affect the growing market, the prices, etc.? (Ec) On decomposer chart show how the dead animal and plant life remains and the waste products of living things are attacked and consumed by fungi, bacteria and other micro-organisms of decay. Depict by a cycle, how the last remains of energy are utilized and returned to their original components such as nitrogen and carbon to the soil, air and water (see nitrogen and carbon	teering behavio

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS
LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	cycle explanation later and also appendix). -What would happen if there were not decomposers? -Are all materials decomposable? -What does bio-degradable mean? (Ec) Have children illustrate the food chain cycle on mural, bulletin boards or models of all three producers, consumers and decomposers in action. (Ec)	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Children observe through discovery how living things have specific characteristics and life activities and how they are dependent on a suitable environment.	Probe pupil investigations from Concepts in Science III to observe categorize and classify characteristics held in common for all animal life. See pp. 184-188 Alive or not alive pp. 189-191 Where living things must live p. 192 Food for living things pp. 194-208 Alike or different As summarizing activities children may plan exhibits or programs resulting from their studies; display murals charts or booklets developed during studies; select a specific animal or plant to write about or comparing "live" plants with "plastic" plants to show evidence one lives because of basic characteristic necessary for all plant life (moves, reproduces, grows, etc.) Interested children can further expand the learned concepts by taking approaches of pullution which may affect the growth processes of plants and animals. (Ec)	The child displayin oped indi tively du The child coveries ment whic result of ilated fr ities.

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Children seek inquiry into the nature of plants and how they reproduce and grow in order to accumulate knowledge for understanding our dependency upon plants.	Probe pupil investigations from Concepts in Science III to discover how plants are classified through possession of common structure and to discover how plants produce by seeds and spores. See p. 215 What makes a plant green p. 219 How plants grow without chlorophyll p. 220 Mold and fold pp. 223-224 Mushroom and similar fungi p. 225 Yeast plants p. 226 Food for fungi pp. 230-231 What is inside a flower p. 232 Plants with cones pp. 236-239 A look inside the stems p. 240 Algae Children can have "collection corners" from which they can draw upon for art activities such as leaf printing, three-D flower pictures, seed projects, etc. -Are all plants and parts of plants perfectly formed? Note imperfections. -How have pesticides played a role for increasing plant growth? -When pesticides destroy the pests eating the plants what happens to the population of insects in the food chain which served as its food? Is it increased? Does it do more damage? (Ec)	Child respon 65% of knowl through test developed by Child shows acting respo materials wi being concer use and care which help i process.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Through research of textbooks and library books children will become familiar with and outline the principles and generalizations of the carbon cycle and the nitrogen cycle.	Have children illustrate the nitrogen cycle by including these following factors: Nitrogen (4/5 of atmosphere) is useless in its form. First nitrogen fixing bacteria and algae of the soil must use it in their life processes and convert it into salts (nitrates). As these nitrates are released in the soil, the roots of plants absorb it and use it in their manufacture of their proteins. Any animal then eating the plant will partake of it by way of the food chain process. The nitrogen is then returned to the soil through excreted waste products or through death of the organism. The bacterias again begin the cycle. Children can use familiar plants and animals from the local area to depict the scenes. (Ec) Carbon Cycle Have children begin to internalize the carbon cycle concept by showing cyclic charts which depict the importance of man and plant interchanging carbon and oxygen. Carbon starts as green plants, using the radiant energy of the sun, manufacture sugar and starches from atmospheric carbon dioxide and water during photosynthesis. These compounds then contain energy as chemical energy available as food. Animals and humans release carbon dioxide back in air or water through waste products. Decomposers break down the products of waste and death and release carbon dioxide into atmosphere. Man also burns fossil fuel (coal, oil) which become a source of poisonous pollution. Stress the contribution of carbon to the atmosphere by microorganisms decaying matter and by burning of fossil fuels (coal, oil, gas) which come originally from the air that the ancient green plants used in photosynthesis millions of years ago. Point	Children lo of the carb able to exp environment. Children lo of the nitr are able to environment. Children co the meaning by excess c luted air a quences it survival. Children de standing of ing and acc that some " necessary p Children be degrees of arrive at s question - really poll

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C. Men, responding to special environments, create objects and events symbolic of their interaction.

	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
books en h and nd arbon ycle.	Have children illustrate the nitrogen cycle by including these following factors: Nitrogen (4/5 of atmosphere) is useless in its form. First nitrogen fixing bacteria and algae of the soil must use it in their life processes and convert it into salts (nitrates). As these nitrates are released in the soil, the roots of plants absorb it and use it in their manufacture of their proteins. Any animal then eating the plant will partake of it by way of the food chain process. The nitrogen is then returned to the soil through excreted waste products or through death of the organism. The bacterias again begin the cycle. Children can use familiar plants and animals from the local area to depict the scenes. (Ec) Carbon Cycle Have children begin to internalize the carbon cycle concept by showing cyclic charts which depict the importance of man and plant interchanging carbon and oxygen. Carbon starts as green plants, using the radiant energy of the sun, manufacture sugar and starches from atmospheric carbon dioxide and water during photosynthesis. These compounds then contain energy as chemical energy available as food. Animals and humans release carbon dioxide back in air or water through waste products. Decomposers break down the products of waste and death and release carbon dioxide into atmosphere. Man also burns fossil fuel (coal, oil) which become a source of poisonous pollution. Stress the contribution of carbon to the atmosphere by microorganisms decaying matter and by burning of fossil fuels (coal, oil, gas) which come originally from the air that the ancient green plants used in photosynthesis millions of years ago. Point	Children look for evidences of the carbon cycle and are able to explain it in their environment. Children look for evidences of the nitrogen cycle and are able to explain in their environment. Children contrast and discuss the meaning of polluted air by excess carbon and unpolluted air and what consequences it holds for their survival. Children demonstrate understanding of cycle by realizing and accepting the fact that some "pollution" is a necessary part of the cycles. Children begin to question degrees of pollution and to arrive at some answers to the question - "When is pollution really pollution?"

SUPPORTING CONCEPTS

LEVEL I-3

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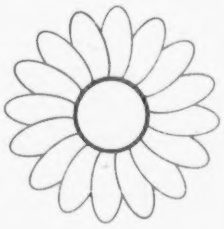
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	out the extremely rapid rate at which release of carbon dioxide is now taking place and its consequence to our environment and climate. Recall with the children some incidents of poisonous pollution which took place in Donora, Penn. and London, England. (Ec)	



SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
In light of previous understandings about food webs children will reflect and speculate about the consequences of the use of pesticides: insecticide, herbicide, and fungicide.	Have children learn the terms (see appendix): pesticides-insecticide, herbicide, and fungicide. Give children opportunity to explore the meanings of ridding unwanted insects from plants (insecticide) of ridding unwanted (weeds) plants from landscape (herbicide) of ridding unwanted parasites (fungicide) from planted areas. -When is a pest a pest? -When is a weed a weed? -When is fungus unwanted? -When pests are sprayed what happens to other garden insects? -When weeds are sprayed what happens to the poison which lands on the ground? Are other useful organisms destroyed by the pesticides? -Are there any useful insects? (L-P) Have interested children gather information about a specific insect which is doing harm to a plant or tree and have them report to the class what action is being taken to rid the pest. Other children may gather information on ways to rid pests other than through insecticides such as the work being done on the Dutch elm disease caused by a bark bettle and its fungus infection. Wasps-(see articles in bibliography, Instructor, March, 1971 and Ranger Rick, April, 1971) are being imported to feed upon beetles. Also the odor of the female beetle is being synthetically produced to help capture the male beetle. -What action should we take when we see an insect in the garden or yard? -Where can we locate more information about insects, good and bad? (L-P)

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
nder- ebs and nse- pesti- rbicide,	Have children learn the terms (see appendix): pesticides-insecticide, herbicide, and fungicide. Give children opportunity to explore the meanings of ridding unwanted insects from plants (insecticide) of ridding unwanted (weeds) plants from landscape (herbicide) of ridding unwanted parasites (fungicide) from planted areas. -When is a pest a pest? -When is a weed a weed? -When is fungus unwanted? -When pests are sprayed what happens to other garden insects? -When weeds are sprayed what happens to the poison which lands on the ground? Are other useful organisms destroyed by the pesticides? -Are there any useful insects? (L-P) Have interested children gather information about a specific insect which is doing harm to a plant or tree and have them report to the class what action is being taken to rid the pest. Other children may gather information on ways to rid pests other than through insecticides such as the work being done on the Dutch elm disease caused by a bark bettle and its fungus infection. Wasps-(see articles in bibliography, Instructor, March, 1971 and Ranger Rick, April, 1971) are being imported to feed upon beetles. Also the odor of the female beetle is being synthetically produced to help capture the male beetle. -What action should we take when we see an insect in the garden or yard? -Where can we locate more information about insects, good and bad? (L-P)	Children define accurately the meanings of pest and weed. Children discriminate between unwanted insects and those which are useful. Children list choices for wanted and unwanted plants in their environment. Children discuss alternate ways to get rid of pests. Their choices reflect their concern for protecting and preserving useful plants and animals in their environment. Children seek evidences in their environment which show indescriminate use of pesticides. Children read labels on pesticides and show concern for content by discussing them with their parents, relatives or schoolmates.

SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Make a survey of home and community pests in your area. Discover what kinds of pest control is being used. -How effective are they? -What other choices of control are there? -Can we remove pests without spraying? -Is it possible to pull out weeds instead of spraying? -Have you ever talked to a pest control worker in your community to see what kinds of poisons they are using? -Do you check labels on poisons to discover their content? (see appendix) -Do you know what to do if accidently a child drinks the poisonous spray? (L-P) Fast or extremely interested students can learn and report about natural poison extracted from plants such as nicotine sulphate, rotenone or phyrethrun. -Seek information from companies listed in the yellow pages of telephone directory. -Discover and relate alternates for insect extermination.	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
The children will make comparisons of facts to determine whether air pollutants affect plant life.	Have children grow two identical boxes of radishes, grass, or flower seeds using some ingredients of rich soil, application of daily watering and exposure to sunlight. Add a household candle to one box, light and cover with dome glass or metal and allow to burn 5-10 minutes or until candle burns up existing oxygen. Do this daily for a week. Begin comparing color, texture, and strength of plants. Increase time of experiments to hasten effects. Additional experiments for effects of air pollutants on plants can include burning other fossil fuels, coal, oil, paper, clothes, charcoal, etc. -Note colors of plants. -What is happening to the shades of color? -Is the texture of plants affected? -Is the strength of the plant affected? -What other differences are showing up? -Look in your environment. Can you find similar things happening on plants? -Can you predict what will happen? -Note trees in the neighborhood where there is heavy air pollutants. -Describe and record your findings. (A)	Children can and describe causing chang due to polluta Children show concern for p reacting to e tions.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
com- ter- ants	Have children grow two identical boxes of radishes, grass, or flower seeds using some ingredients of rich soil, application of daily watering and exposure to sunlight. Add a household candle to one box, light and cover with dome glass or metal and allow to burn 5-10 minutes or until candle burns up existing oxygen. Do this daily for a week. Begin comparing color, texture, and strength of plants. Increase time of experiments to hasten effects. Additional experiments for effects of air pollutants on plants can include burning other fossil fuels, coal, oil, paper, clothes, charcoal, etc. -Note colors of plants. -What is happening to the shades of color? -Is the texture of plants affected? -Is the strength of the plant affected? -What other differences are showing up? -Look in your environment. Can you find similar things happening on plants? -Can you predict what will happen? -Note trees in the neighborhood where there is heavy air pollutants. -Describe and record your findings. (A)	Children can discriminate and describe conditions which causing changes in plant life due to pollutants in the air. Children show evidence of concern for plant life by reacting to existing conditions.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
The non-exhaustible supply of energy comes from the sun. To make meaningful the concept that there is a dependency of living things on the sun's energy, children read and research in their textbooks a about the relationships between the sun's energy and our environment.	Probe pupil investigations from Concepts in Science III to arrive at generalizations about how energy from the sun is utilized in daily living. See p. 3 Changing light into heat pp. 13-14 Plants capture sunlight p. 15 Green leaves and sunlight p. 18 Animals and the sun's energy pp. 19-20 Animals and their food -What happens to our electric bill in the winter time when there is less sunlight than at summertime? -How does this affect our need for electric-generating plants? -What happens to our electrical needs when many people move into our neighborhood? -What happens to our feeling when we go to the beach or vacation spot where there happens to be no direct sunlight because of heavy clouds? -What happens to a city which is covered with a layer of smog and direct sunlight is hidden? -How are we dependent on sunlight for our recreational needs? (Ec)	Chi the sun liv Chi the is liv Chi que sun of mar Chi pla ric lig

TS

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TIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
le supply rom the sun. l the concept ependency of the sun's read and re- xtbooks a nships between nd our envi-	Probe pupil investigations from Concepts in Science III to arrive at generalizations about how energy from the sun is utilized in daily living. See p. 3 Changing light into heat pp. 13-14 Plants capture sunlight p. 15 Green leaves and sunlight p. 18 Animals and the sun's energy pp. 19-20 Animals and their food -What happens to our electric bill in the winter time when there is less sunlight than at summertime? -How does this affect our need for electric-generating plants? -What happens to our electrical needs when many people move into our neighborhood? -What happens to our feeling when we go to the beach or vacation spot where there happens to be no direct sunlight because of heavy clouds? -What happens to a city which is covered with a layer of smog and direct sunlight is hidden? -How are we dependent on sunlight for our recreational needs? (Ec)	Children list ways in which the light energy from the sun is utilized in our daily living. Children list ways in which the heat energy from the sun is utilized in our daily living. Children speculate on consequences of daily living when sunlight is reduced because of atmospheric conditions, man-made or natural. Children seek and report upon plant life which had deteriorated because direct sunlight was limited or denied.

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
Children will develop skill in comprehending the relationship between sunlight and plants and will demonstrate through simple experiments how energy from the sun is captured.	Review experiments performed in science books in which some plants were denied sunlight. Have children grow several kinds of edible plants (radish, carrot, lettuce, etc.) Control sunlight for a few so that there will be an opportunity to test for texture and flavor. When plants have matured and are ready to be eaten, children can have a salad brunch. Similar vegetables can be brought from home to round out portions for all. (Feed leaves and scraps to pets (hamster, rabbit) which might be in the classroom. Review exercises from textbook which indicate fruits and vegetables are staple items for health and energy. -Where did the plants get their energy? -How do we get that energy? -Did we gain all the energy the plant got from the sun or did the plant use some of it? -Review food chain idea. How else can we get energy from the sun? -What happens to plants when sunlight is hidden from them? -What happens to people when they eat plants which saw little sunlight? -Is the texture or flavor different? -What does impoverished plants do for our aesthetic appeal? (A-Ec)	Chil gui twe pla nit sunl Chil den sil ing of Chi envi whi lig

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
skill ela- ght and trate ents n is	Review experiments performed in science books in which some plants were denied sunlight. Have children grow several kinds of edible plants (radish, carrot, lettuce, etc.) Control sunlight for a few so that there will be an opportunity to test for texture and flavor. When plants have matured and are ready to be eaten, children can have a salad brunch. Similar vegetables can be brought from home to round out portions for all. (Feed leaves and scraps to pets (hamster, rabbit) which might be in the classroom. Review exercises from textbook which indicate fruits and vegetables are staple items for health and energy. -Where did the plants get their energy? -How do we get that energy? -Did we gain all the energy the plant got from the sun or did the plant use some of it? -Review food chain idea. How else can we get energy from the sun? -What happens to plants when sunlight is hidden from them? -What happens to people when they eat plants which saw little sunlight? -Is the texture or flavor different? -What does impoverished plants do for our aesthetic appeal? (A-Ec)	Children are able to distinguish and discriminate between healthy and unhealthy plants due limited opportunity to capture energy from sunlight. Children grow seeds in gardens or plantboxes on window sills to increase understanding of needs and functions of plants. Children display awareness of environmental conditions which deny plants direct sunlight.

SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVAL
Children will continue to seek ways man conserves his energy and uses the energy of water in motion and air in motion through experiments conducted in science textbooks and through observation of their environment.	Probe pupil investigations from Concepts in Science III to become aware of two forms of energy, stored energy and energy of motion. See pp. 32-33 Still water and moving water p. 34 Moving water turns a wheel p. 35 Moving water has energy pp. 36-37 Using energy from moving water pp. 38-39 Where the energy begins p. 44 Using moving air p. 48 Energy from a candle turns a wheel pp. 50-52 Plenty of energy pp. 54-57 Energy in food p. 61 Electric energy to make things move pp. 64-66 Using an electromagnet to ring a bell pp. 67-68 Making and using an electric motor -How can we make moving air do work for us? -How can we make moving water do work for us? -In what ways does industry use water? -In what ways does industry using water pollute our waterways? -How can moving air "clean" our polluted atmosphere? -How do we get energy from electricity? -How many sources of electrical energy do we have in our home or school? -How can we conserve electrical energy so that the need for building more and larger generators are lessened? (Ec)	Chil of m movi usef Chil on u wat the is d ener Chil cal lif Chi cons Chil in u

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
le to seek s energy f water motion onducted and f their	Probe pupil investigations from Concepts in Science III to become aware of two forms of energy, stored energy and energy of motion. See pp. 32-33 Still water and moving water p. 34 Moving water turns a wheel p. 35 Moving water has energy pp. 36-37 Using energy from moving water pp. 38-39 Where the energy begins p. 44 Using moving air p. 48 Energy from a candle turns a wheel pp. 50-52 Plenty of energy pp. 54-57 Energy in food p. 61 Electric energy to make things move pp. 64-66 Using an electromagnet to ring a bell pp. 67-68 Making and using an electric motor -How can we make moving air do work for us? -How can we make moving water do work for us? -In what ways does industry use water? -In what ways does industry using water pollute our waterways? -How can moving air "clean" our polluted atmosphere? -How do we get energy from electricity? -How many sources of electrical energy do we have in our home or school? -How can we conserve electrical energy so that the need for building more and larger generators are lessened? (Ec)	Children examine evidences of man's utilization of moving air and describes its usefulness. Children conduct experiments on using energy from moving water and become aware of how the home, community and school is dependent on this form of energy. Children relate how electrical energy has changed the life style of man. Children suggest ways to conserve electrical energy. Children practice conservation in use of electricity.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
As children continue their scientific probe into pupil investigations, they will study and recall the characteristics of soil, its functions and the plants reliance upon it for survival.	Probe pupil investigations from Concepts in Science III to discover the origin and characteristics of soil and our dependence on it. See pp. 159-160 In the soil p. 161 Water in the soil p. 162 Air in the soil p. 163 Minerals in the soil pp. 166-167 Kinds of soil that hold water pp. 168-170 Soil in the woods and on the deserts p. 171 The needs of living things p. 172 What roots do for a plant p. 176 Good and poor soil pp. 177-178 How poor soil is made better -What happens to soil when man takes away plant and tree life? -What happens to the living things in soil (such as earthworms and bacteria) when man sprays poisons (herbicides, insecticides) on it? -What happens to plants when the soil is depleted from its rich organic supplies? -How can we keep the soil fertile? (L) Children learn about crowded conditions-population pressure on the ecosystem. Plant radish seeds in two boxes under identical conditions double and triple the number of seeds in the second box. Note and compare size, texture and quality of plants as they grow. -Is there a right number of seeds we can plant in a given area before plant life is stunted? (carrying capacity) -What happens when people demand more plants for food to be grown in a given area?

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TIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
nue their into pupil hey will the charac- , its func- nts reliance val.	Probe pupil investigations from Concepts in Science III to discover the origin and characteristics of soil and our dependence on it. See pp. 159-160 In the soil p. 161 Water in the soil p. 162 Air in the soil p. 163 Minerals in the soil pp. 166-167 Kinds of soil that hold water pp. 168-170 Soil in the woods and on the deserts p. 171 The needs of living things p. 172 What roots do for a plant p. 176 Good and poor soil pp. 177-178 How poor soil is made better -What happens to soil when man takes away plant and tree life? -What happens to the living things in soil (such as earthworms and bacteria) when man sprays poisons (herbicides, insecticides) on it? -What happens to plants when the soil is depleted from its rich organic supplies? -How can we keep the soil fertile? (L) Children learn about crowded conditions-population pressure on the ecosystem. Plant radish seeds in two boxes under identical conditions double and triple the number of seeds in the second box. Note and compare size, texture and quality of plants as they grow. -Is there a right number of seeds we can plant in a given area before plant life is stunted? (carrying capacity) -What happens when people demand more plants for food to be grown in a given area?	Children participate in plant growth experiments. Children can recall the origin of soil and its composition. Children list ways in which man abuses the soil. Children observe and show concern for soil when there is pesticide spraying. Children can describe optimum conditions for planting seeds in soil. Children show awareness for the demands upon the soil as man continues his population growth rate.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-What occurs when there is not enough plants for food for all people? -Are there other ways to grow food than in soil? -How does man abuse soil?	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
Wherever man lives he mines the environment. Through committee or group research children will identify and record the variety of renewable and non-renewable resources available to man.	List all renewable resources (trees, plants, water, air, etc.) and non-renewable resources (coal, oil, gas, metals, etc.) -Are there more of some kind than others in our neighborhood or in nearby communities? -Can we bring in samples in their original form and some in their final form? (i.e. tree-paper, iron ore-metal item, etc.) (En) Have children start some record keeping device, (charts, booklets, etc.) in which they will record the answers to the question, "Where do I get what I need to live?" -Is the item essential for survival? -Is the item a luxury? (En) Have children seek information to substantiate evidence that: 1) Man mines the soil through agricultural products. 2) Man mines the soil for various metals and non-mentals. 3) Man mines the air for its nitrogen. 4) Man mines the ocean for a variety of reasons. Simulate or play act scenes of man doing each task. -What activity is done in our community? -In what ways is man protecting and conserving the resources? -Are there evidences that man is polluting or abusing his environment in our neighborhood, our city or our waters? -What is being done to cut down pollution? -What would you do to help if you could to help preserve the environment? (En)	Children recogn ference between non-renewable r can recall a fe category. Children determ job, a parent or is directly wit a resource or w aiding a man wh directly with i Children show a concern for how the environment

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
ti- f	List all renewable resources (trees, plants, water, air, etc.) and non-renewable resources (coal, oil, gas, metals, etc.) -Are there more of some kind than others in our neighborhood or in nearby communities? -Can we bring in samples in their original form and some in their final form? (i.e. tree-paper, iron ore-metal item, etc.) (En) Have children start some record keeping device, (charts, booklets, etc.) in which they will record the answers to the question, "Where do I get what I need to live?" -Is the item essential for survival? -Is the item a luxury? (En) Have children seek information to substantiate evidence that: 1) Man mines the soil through agricultural products. 2) Man mines the soil for various metals and non-mentals. 3) Man mines the air for its nitrogen. 4) Man mines the ocean for a variety of reasons. Simulate or play act scenes of man doing each task. -What activity is done in our community? -In what ways is man protecting and conserving the resources? -Are there evidences that man is polluting or abusing his environment in our neighborhood, our city or our waters? -What is being done to cut down pollution? -What would you do to help if you could to help preserve the environment? (En)	Children recognize the difference between renewable and non-renewable resources and can recall a few in each category. Children determine whether a job, a parent or relative holds is directly with developing a resource or whether it is aiding a man whose job is directly with it. Children show awareness and concern for how man mines the environment.

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Through role playing, allow children to display how man first grew his food and hunted for it. Have them develop their civilization and display how only a few are needed to farm and hunt and that others are dependent upon them for their food needs. Continue to show that the other now need to find ways to make a living to buy food which they no longer can grow or hunt for and how they also create materials, tools, and forms of energy which the farmer or rancher needs to make his work easier. -Why doesn't everybody grow or raise their own food? -Which jobs that man has are essential and which jobs are non-essential? -Which jobs work directly with renewable resources? Are there any we can see in our neighborhood or city? -Which jobs work directly with non-renewable resources? In our neighborhood are there any? (En)	
	Make models of man utilizing his resources in a variety of environments using many topographical settings (ranches, groves, forests, irrigated deserts, mines, ocean-fishing, etc.) (En)	
	Create collages, murals, and friezes depicting man at work and at play. (En)	
	Have children participate in planting gardens, trees and grassy areas. (En)	

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Simulate or pantamine panning for gold, mining for metals, logging trees, tilling the soil, fishing for seafood or hunting for wildlife. -If resources are renewable what is my role in caring for the supply? -If resources are non-renewable what can I do to keep them as long as I can? (En)	

SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T
Children will observe and respond to the ways man has exploited his environment in seeking resources to satisfy his needs.	Collect data and record observations on evidences that man has exploited his environment. Land - open space versus housing developments and industrial complexes. - strip mining - refuse disposal Air - quality for health - visibility - noise levels Water - thermal pollution - chemical pollution - solid waste pollution Plants - insecticides & - herbicides Animals - fungicides -Who is doing the polluting? -Are we using the polluter's products? -Do we share a blame then for pollution? -How can we cut our demands upon industry in order to slow down pollution? (En) Take a field trip to an area which has been deforested or burned to observe results; to a reservoir to note silt which is a result of erosion from destroyed forest areas. If streams are nearby, visit them to note the muddy quality of water. View films on the same scene if first-hand observation is not readily available. -How does a forest fire contribute to pollution? -What will it cost us if reservoirs are filled with silt? -Who needs a stream? (L-W)	Children rest ment in whic determine wha meated land, plant and ani Children obse the results c and its conse environment. Children note of occupatio such as strip cidal sprayi pollution an about them.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
s t-	Collect data and record observations on evidences that man has exploited his environment. Land - open space versus housing developments and industrial complexes. - strip mining - refuse disposal Air - quality for health - visibility - noise levels Water - thermal pollution - chemical pollution - solid waste pollution Plants & Animals - insecticides - herbicides - fungicides -Who is doing the polluting? -Are we using the polluter's products? -Do we share a blame then for pollution? -How can we cut our demands upon industry in order to slow down pollution? (En) Take a field trip to an area which has been deforested or burned to observe results; to a reservoir to note silt which is a result of erosion from destroyed forest areas. If streams are nearby, visit them to note the muddy quality of water. View films on the same scene if first-hand observation is not readily available. -How does a forest fire contribute to pollution? -What will it cost us if reservoirs are filled with silt? -Who needs a stream? (L-W)	Children restudy the environment in which they live to determine what pollutants permeated land, air, sea and plant and animal life? Children observe and evaluate the results of deforestation and its consequences for the environment. Children note the consequences of occupational destruction such as strip mining, pesticidal spraying and industrial pollution and raise questions about them.

SUPPORTING CONCEPTS

LEVEL I-3

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C. Men, responding to special environments, create objects and events symbolic of their interaction.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Take a field trip to a mining area if near one and note its operation and its waste disposal system or show a film depicting the same scenes. -Why bother mining? -What demands do we make upon miners? -Will materials cost more if miners have to spend money on cutting down on water pollution? Who pays? (L) Take a field trip to an industrial area which uses one of the natural resources. Note its production level, its power to operate, its method for waste disposal, and the effects upon the nearby community. -Do I use the products of that industry? -Is it essential for survival? -Has increased population put greater demands on the industry? -Weigh the value of the product compared to what effects it has on polluting the environment. -Am I willing to pay more for the product to absorb the cost of removing the pollutant? (En) View films on farming, tree farming and animal husbandry. Note the many kinds of dangers and attacks that are made upon plant and animal life. Note kinds of pesticides that are used to control or limit losses. -If no pesticides were used what costs in production would result? -How much pesticide control is necessary? -When does abuse in its use occur? -Are pesticide users aware if its side-effects or its secondary effects on other plant and animal life?	

SUPPORTING CONCEPTS

LEVEL I-3

A. Life and environment interchange matter and energy.

B. Men utilize the environment to secure their needs.

C. Men, responding to special environments, create objects and events symbolic of their interaction.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-Is anything being done in our community to find better ways to control the enemies of our plant and animal life? (Ec) Find a high spot such as a cliff overlooking a city or an observation lookout on a tall city building. Observe visibility. Breathe deeply and smell the air. Listen to kinds of sounds made by the total environment. -Who is creating pollutants? -How do I share responsibility for that pollutant? -What kinds of sounds are necessary, unnecessary? -What health implications are there? Reproduce the scene in an art form to focus on problems for discussion. (A)	

SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Through clarifying discussion and activities the children will attempt to draw conclusions on ways they can become responsible for their choices in using and caring for their natural and physical environment.	Children create slogans such as "Return, Recycle, Reuse" or "Share, Care, Beware." They look about their environment and discover what items from the natural resources they are using (paper, cardboard boxes, egg cartons, tin cans, etc.). Have children note the original use for the items. List additional reuses for items. -If no longer usable in present form how can it be recycled and reused again? -How many ways can an article be used other than its original purpose? (En) Have children collect articles about all the new ideas of reclamation or used materials large companies are projecting. Participate in local drives. Look for reclamation areas such as the American Can Company has. Note especially Lucky Breweries experimentation on using old glass bottles to create "glasphalt" for highways. -How is industry trying to help reclaim and recycle their own product? -What do they expect for us to do as our share in their program? -Are we willing to cooperate? -In what ways can we show our responsibility? (En) Have children look about their home and notice furnishings which need repair or additional care. Have children ask older relatives to teach them simple repair techniques. -How can we make the tools, equipment and furnishings in our home last longer?	Childre new use Before product whether use for Before ucts ch how the contrib polluti its pur thinkin quences Childre environ paigns reuse p can, bo

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TIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-3

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T F
	-In what way do I contribute to my family's needs when I take responsibility or concern for my home. (En) Children speculate about the kinds of activities they can perform in their home environment which will beautify their home and make it more pleasing to the eye with little or no cost. -Can I create new frames for pictures from plastic discards? -Can painted old pans be used for flower pots? -Can candy dishes or kincknacks be made from scrap metal, etc.? -How does it make me feel when I help our house become a home? (En)	

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL I-3

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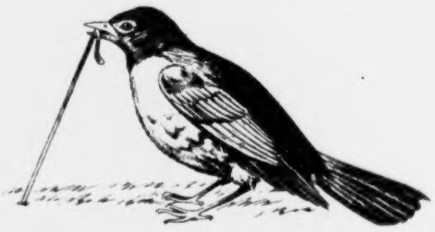
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINA PERFORM
Man assumes responsibility for the choices he makes. Children will display preferences for aesthetic principles by producing an art or music project which will reflect a choice which they had made on a "wise use" of the environment.	Children can create slogans, posters, cartoons or poems which carry the message that it is our choice to live in the present condition of our environment or to change it for the better. Use any form of art or music media to develop their choices. -What message am I trying to communicate? -What is the most effective media to work in? -Will my product be an example of wise use of a resource or will it also be a contributing pollutant? -How does it make me feel to be contributing to a solution for answering a huge problem? (En)	Children' create ob art through art or which reflect thei and values. Children display p being part of a so the environmental



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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
er- les c a on ment.	Children can create slogans, posters, cartoons or poems which carry the message that it is our choice to live in the present condition of our environment or to change it for the better. Use any form of art or music media to develop their choices. -What message am I trying to communicate? -What is the most effective media to work in? -Will my product be an example of wise use of a resource or will it also be a contributing pollutant? -How does it make me feel to be contributing to a solution for answering a huge problem? (En)	Children create objects of art through art or music forms which reflect their standards and values. Children display pride in being part of a solution to the environmental problem.

SUPPORTING CONCEPTS

LEVEL I-3

A. Life and environment interchange matter and energy.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
Children evaluate each other's proficiency in care for their school or home environment through the language arts drama media.	Children can set criteria for standards for living in school and home. They can enact scenes reflecting wise use or misuse of the environment such as discarding trash properly or carelessly, such as destroying bushes and plants on the way to school or participating in school and neighborhood beautification programs. Children note and report on violations in room or schoolgrounds. Recognition is given to those who initiate responsible behavior or gives beyond expected care and concern. Puppetry can be a useful vehicle of expression. -What kind of a world do I want to live in? -What things are beautiful for me? -How can I change my messy habits? -In what ways can I help my fellow classmates create a beautiful classroom? (En)	Children set st room cleanlines ipate in mainta ards. Children show p evaluating each cesses and weak

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
h other's or their nment arts drama	Children can set criteria for standards for living in school and home. They can enact scenes reflecting wise use or misuse of the environment such as discarding trash properly or carelessly, such as destroying bushes and plants on the way to school or participating in school and neighborhood beautification programs. Children note and report on violations in room or schoolgrounds. Recognition is given to those who initiate responsible behavior or gives beyond expected care and concern. Puppetry can be a useful vehicle of expression. -What kind of a world do I want to live in? -What things are beautiful for me? -How can I change my messy habits? -In what ways can I help my fellow classmates create a beautiful classroom? (En)	Children set standards for room cleanliness and participate in maintaining standards. Children show proficiency in evaluating each others successes and weaknesses.

LEVEL II$_4$

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

SYMBOLS

L - Land

A - Air

W - Water

EC - Ecology, Plants and Animals

EN - Environment, Population

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Green plant is the prime producer. Through study of ecological principles, children recall that the green plant is the prime producer and that green plants obtain matter for growth from soil, air and water.	Probe pupil investigations from Concepts in Science IV to discover how green plants (producers) get their source of matter from growth from soil, air, and water and how they return matter back to soil, air and water. See pp. 136-137 An investigation into where green plants will grow pp. 140-142 The scientist and the willow tree pp. 143-145 An investigation into some substances in soil p. 146 An apple tree is a factory pp. 147-149 An investigation into what sugar is made of p. 150 An investigation into energy for a green plant pp. 153-156 An investigation into growth in a plant pp. 157-158 A tree falls p. 159 An investigation into a piece of bread pp. 163-164 Three seedlings pp. 164-170 The importance of the elm -Do plants move about to get food? -How dependent are plants on the air about them? -Can plants receive nutrients of the soil without water? -What is made by green plants that man needs for his growth? -Do all plants produce their own food? -Does the soil need replenishing? (Ec)	Children pla to increase life cycles Children exp trolling lan in growing p insight into challenge th

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TEACHING-LEARNING INQUIRIES

Probe pupil investigations from Concepts in Science IV to discover how green plants (producers) get their source of matter from growth from soil, air, and water and how they return matter back to soil, air and water.

See pp. 136-137	An investigation into where green plants will grow
pp. 140-142	The scientist and the willow tree
pp. 143-145	An investigation into some substances in soil
p. 146	An apple tree is a factory
pp. 147-149	An investigation into what sugar is made of
p. 150	An investigation into energy for a green plant
pp. 153-156	An investigation into growth in a plant
pp. 157-158	A tree falls
p. 159	An investigation into a piece of bread
pp. 163-164	Three seedlings
pp. 164-170	The importance of the elm

-Do plants move about to get food?
-How dependent are plants on the air about them?
-Can plants receive nutrients of the soil without water?
-What is made by green plants that man needs for his growth?
-Do all plants produce their own food?
-Does the soil need replenishing?

(Ec)

EVALUATION-TERMINAL PERFORMANCE

Children plant and grow seeds to increase understanding of life cycles of plants.

Children experiment with controlling land, air, and water in growing plants to develop insight into questions which challenge their thinking.

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
The compost pile represents natural recycling. Children will choose and classify those kinds of solid waste which can be returned to the environment through compost piles.	Have children start a compost pile after explaining how necessary it is to return organic matter (decayed plant and animal life) to the soil in order to have the proper nutrients available for plant production. Recipe: A ratio of 3 parts waste to one part raw manure. 1. Waste: weeds, garden prunings, table scraps, garbage, coffee grounds, etc. 2. Raw barnyard fertilizer: cow, horse, chicken manure, etc. 3. Lime or wood ashes (if soil needs to be alkalized) sprinkled on lightly. 4. Earth (rich in nitrogen if possible) enough to cover pile. 5. Water for moistening (not soaking). Lay materials in alternate layers. Allow time for bacterial action. Turn compost pile occasionally. -How are we helping to keep soil productive? -In what ways does using waste products contribute in solving our land disposal problems? -In what ways are we cutting costs using compost piles instead of commerical fertilizers. (L-Ec) Use compost pile to fertilize soil in which children grow seeds. Compare with soil not using compost pile. (Ec)	Children sort ic garbage in tainers. Children loca yard or boxes to experiment compost piles Children use seeds in soil compost.

PTS

A. Life converts matter and energy into characteristic species form.

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C. Cultures are characterized by their special ways of reacting to the environment.

CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
represents g. oose and clas- of solid waste urned to the ugh compost	Have children start a compost pile after explaining how necessary it is to return organic matter (decayed plant and animal life) to the soil in order to have the proper nutrients available for plant production. Recipe: A ratio of 3 parts waste to one part raw manure. 1. Waste: weeds, garden prunings, table scraps, garbage, coffee grounds, etc. 2. Raw barnyard fertilizer: cow, horse, chicken manure, etc. 3. Lime or wood ashes (if soil needs to be alkalized) sprinkled on lightly. 4. Earth (rich in nitrogen if possible) enough to cover pile. 5. Water for moistening (not soaking). Lay materials in alternate layers. Allow time for bacterial action. Turn compost pile occasionally. -How are we helping to keep soil productive? -In what ways does using waste products contribute in solving our land disposal problems? -In what ways are we cutting costs using compost piles instead of commerical fertilizers. (L-Ec) Use compost pile to fertilize soil in which children grow seeds. Compare with soil not using compost pile. (Ec)	Children sort trash and organic garbage in separate containers. Children locate corners in yard or boxes where possible to experiment with creating compost piles. Children use pile and grow seeds in soil containing compost.

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
From exposure to various instructional materials children will attempt to arrive at decisions concerning both the needs for and limits on the use of herbicides, insecticides and fungicides.	The teacher will need to acquire some background information on pesticides: herbicides, insecticides, and fungicides. The appendix of "Since Silent Spring" (see appendix) has excellent, specific information to safer pesticides for garden and home use as well as those to be avoided. The children need to understand that pesticides are useful to man if the proper ones are used in the correct portions. They also need to realize that a pest becomes a pest only if it localizes in excess numbers. The activity below illustrates how the pesticides spray to, not only spot treatment areas, but also to all the surrounding environment. Lay collected leaves or cuts of colored paper on a white background of butcher paper or clear newsprint. Vegetable dye some water and using a flit gun sprayer, generously spray the leaves or colored paper. Remove leaves or paper and note how the spray contaminated the surrounding area of the background paper. -What harm is there in spraying the neighboring plants? -What occurs when good insects (i.e. ladybug, beetle) are nearby? -What happens to the soil that is hit by the spray? -Poison on one leaf is not too harmful, but if a squirrel or other animal ate several leaves what might happen to him? (food chain-biological magnification-see glossary). -DDT has created harmful effects for pelican reproduction. Will concentration of other chlorinated hydrocarbons (see appendix-poisons) affect other plant and animal life? (L-Ec) Research materials from the daily newspaper which carry	Children read check for con ated hydrocar Children pick which appear garden by han Children try oil sprays fi dens and lawn If chemicals children remi double check chemicals (se

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
	recent accounts and trends of new treatment for pesticides. (En)	

A. Life converts matter and energy into characteristic species form.

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C. Cultures are characterized by their special ways of reacting to the environment.

VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	recent accounts and trends of new treatment for pesticides. (En)	

SUPPORTING CONCEPTS

LEVEL II-4

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Through studies of life cycles of animals, children will be able to grasp the meaning of how living things depend on other living things for their food in the energy cycle or food chains and ultimately how they depend on green plants as primary producer of their food supply.	Probe pupil investigations from Concepts in Science IV to examine in detail the life cycles of birds and fishes, to analyze how each organism adapts to his environment through its structural characteristics and to strengthen the concept that living things need a food supply to survive. See pp. 177-180 An investigation into a food supply pp. 181-186 A life cycle p. 187 An investigation into the hatching of an egg pp. 190-194 An investigation into the fitness of a fish pp. 196-197 Salmon and wild duck p. 198 An investigation into a bird's egg pp. 199-201 The life cycle of a duck pp. 203-204 An investigation into the behavior of a bean pp. 205-207 Kinds of behavior pp. 208-209 Adaptation to environment -If the environment in which fish spawn changes due to thermal pollution (heating water from electro-generating plants) what effects might it have on its life cycle? -If birds eat insects or green plants which are heavily contaminated by pesticides what consequences might occur to their life cycle? -What effects will increased algae production on a like due to increased phosphate pollution have on the duck's life cycle? -In what other ways does the life-cycle alter due to man's alteration of a natural habitat? (Ec)	Children findings, cycles f hoods. Children interfer Children promote tection birds an Children sible be ticipati which wo ronment as destr of birds habitat

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SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION- P
Matter and energy is basic to the maintenance of life as evidenced by the food man eats. Children will continue study on the food man eats to reinforce the concept of how energy is transferred to the human organism through our food supply, by participating in activities centered about the "Basic Four" concepts.	Display charts illustrating the basic four categories of foods for good health: Breads and cereals; meat and poultry; milk and dairy products; and fruits and vegetables. Have the children trace back the origins of each group to the prime producer, the green plant. Note that the cow eats grass (or green plants) without which she could not survive nor could produce milk. (Ec) Review the carbon and oxygen cycle with the children to reinforce the concept that man is inter-dependent on his environment for his food cycle. -How has man altered his environment in order to improve conditions for increased plant production, and to improve the quantity and quality of his produce? (fertilizers, pesticides, crop rotation, etc.) -How has man created problems for himself through this new approach? -In what ways have animal, bird, and fish life been affected by our modernization programs? -Is our food supply adequate? -Do I eat more than I need to in order to survive? Do I waste food? (Ec) Have children draw and illustrate a number of their daily foods and trace through arrows or cycles how originally the energy source began at the green plant stage. (Ec)	Children nam group and ca place the fo the correct Children sho their artist they can tra the food the inal prime p plant.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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study re- how o the our pating about ts.	Review the carbon and oxygen cycle with the children to reinforce the concept that man is inter-dependent on his environment for his food cycle. -How has man altered his environment in order to improve conditions for increased plant production, and to improve the quantity and quality of his produce? (fertilizers, pesticides, crop rotation, etc.) -How has man created problems for himself through this new approach? -In what ways have animal, bird, and fish life been affected by our modernization programs? -Is our food supply adequate? -Do I eat more than I need to in order to survive? Do I waste food? (Ec)	Children show evidence through their artistic endeavors that they can trace the origins of the food they eat to the original prime producer, the green plant.
	Have children draw and illustrate a number of their daily foods and trace through arrows or cycles how originally the energy source began at the green plant stage. (Ec)	

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
There is a relationship of population growth to our food supply. Because of an increased consumption need of a growing population, children will seek information to determine how the quantity of green plant life will be affected.	The following activity needs observation of pet's eating habits, preferably two or more. If rabbits or hamsters are being cared for in the classroom, the whole class can participate in observing and making generalizations otherwise children will need to observe pets at home. 1) Observe and record the amount of lettuce or green plant parts the animal eats daily. 2) Introduce into cage a second animal of the same species with no additional food increase. 3) Note the behavior of the two animals. Are they seeking more food or are they satisfied? 4) Keep record of cost to feed one animal and a record of the source of supply. 5) Add additional food and note behavior. Is all the food consumed? How much more did it cost? 6) Add a third or fourth animal with only the original allotted food enough for one animal. What kinds of behavior can be observable now? 7) In order to survive the additional animals will need more food. -How much will the cost be to feed them? -Where will we get the food supply? -Is the additional supply working a hardship on us? How? (Ec) Now conjecture about the population growth -Where will our food supply come from? -Have we enough tillable soil to produce all we need to grow in order to satisfy everyone's appetite? -What other ways can we grow plants? -What costs will be involved for increased production? -What additional kinds of machinery and tools will be needed? (En)	Childre perimen ing of them du sure. Childre of rese keeping servati alizati behavio Childre of supp supply.

A. Life converts matter and energy into characteristic species form.

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C. Cultures are characterized by their special ways of reacting to the environment.

S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
hip of our food sed con- rowing will seek nine how n plant d.	The following activity needs observation of pet's eating habits, preferably two or more. If rabbits or hamsters are being cared for in the classroom, the whole class can participate in observing and making generalizations otherwise children will need to observe pets at home. 1) Observe and record the amount of lettuce or green plant parts the animal eats daily. 2) Introduce into cage a second animal of the same species with no additional food increase. 3) Note the behavior of the two animals. Are they seeking more food or are they satisfied? 4) Keep record of cost to feed one animal and a record of the source of supply. 5) Add additional food and note behavior. Is all the food consumed? How much more did it cost? 6) Add a third or fourth animal with only the original allotted food enough for one animal. What kinds of behavior can be observable now? 7) In order to survive the additional animals will need more food. -How much will the cost be to feed them? -Where will we get the food supply? -Is the additional supply working a hardship on us? How? (Ec) Now conjecture about the population growth -Where will our food supply come from? -Have we enough tillable soil to produce all we need to grow in order to satisfy everyone's appetite? -What other ways can we grow plants? -What costs will be involved for increased production? -What additional kinds of machinery and tools will be needed? (En)	Children participate in experiments to seek understanding of problems confronting them due to population pressure. Children participate in tools of research and analysis by keeping records, logging observations and making generalizations about observable behavior. Children project consequences of supply and demand of food supply.

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Children begin to defend or reject reasons for choices people make in selection of their food supply through discussions about our local needs and "global" needs.	Have children form committees into the basic four categories (see earlier lesson on the basic four) and non-essential foods (candy, cokes, etc.). List all the foods consumed in that category and classify them according to year around availability, cost factor, supply available and whether it is essential for daily survival.	Childr conten tern o what k which surviv
	Have committees report results to the total class on some form of chart or transparencies. The children can then discuss why people choose to buy and eat certain foods rather than another. -Why do we choose expensive foods when cheaper priced foods are just as nourishing (artichokes vs. spinach)? -Who decides what we shall eat? -What sacrifices are we willing to make to pay for non-essential foods? -Do other people in the world have our choices? Why or why not? -Do we produce all our own foods? -How dependent are we on other countries' products (tea, coffee, bananas, etc.)? -How dependent are they on us? (wheat, rice, corn, etc.) -Can other peoples of the world afford to make choices? (Ec)	Childr resear of eat childr Childr for gl classi foods comes the wo food w nation
	View films from local A-V catalogues on food habits of other nations.	
	For fast or interested students, research can be made into several countries diet habits for a basis of comparison with our own. (En)	

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
	Children can create new breakfast, lunch, dinner patterns using the items from the basic four as a framework such as replacing bacon with hamburger patty, citrus fruits with tomatoes or spinach etc. Illustrate or create patterns with any art media. (Ec) Some children can compare basic food patterns of other countries with our own. For example, our hamburger with bun, lettuce, tomato, cheese and meat is very similar to a mexican taco with tortilla, lettuce, tomato, cheese, and meat. Children can make menus with illustrated food patterns. -Where did each food item originate? -Did we grow all the items locally or were we dependent on other locales or nations? (En)	

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
Children investigate the properties of water to help lead to an understanding of why it is necessary to utilize water wisely and to realize how ultimately it affects plant and animal life.	Probe pupil investigations from Concepts in Science IV to explore the principles of evaporation and condensation and of water cycles. See p. 63 On investigation into a disappearing drop of water p. 67 An investigation into getting water from the air p. 72 An investigation into warmed air pp. 74-75 The making of a cloud p. 80 Rivers in the sea p. 81 An investigation into mixing cold and warm water pp. 85-86 The water we eat p. 87 An investigation into water we eat p. 88 The water we drink p. 89 Making a model: A water purifying plant pp. 90-92 On the farm or ranch pp. 93-94 The water cycle -How does evaporation and condensation play a role in our water supply? -How does man interfere with the water cycle? -How does heat energy relate to the water cycle? (W)	Children partic cept-seeking ex Children observe phenomena and d as related to t living with mea riences. Children seek p which indicate changing or int natural water c

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SUPPORTING CONCEPTS

LEVEL II-4

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T
Children will demonstrate their responsibility to the environment by continuing to probe into the cause and effect of water pollution.	Children familiarize themselves with the pollution terms related to water: Thermal pollution (caused by electric-generating plants) Chemical pollution (caused by pesticides) Industrial pollution (caused by residues from industry, including materials used in the home such as phosphates.) Have children take a field trip to any industry which uses water extensively as part of their production process. Observe how plants dispose of "used water." Note the kind of pollution involved. -Is my community supporting industries which contribute to water pollution? -How is the industry planning to curb its pollutant action? -What products from the industry being studied am I using in my home which contributes to further pollution? -Do I really need that product? -What other alternative have I to perform the same task which that product performs? (W)	Children exp for thermal, industrial wa Children lis their role a to pollution products and they use dai Children dem sibility by nate ways to which cut do the demands which is con pollution.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-4

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
To integrate the concepts of how forces change the earth's surface and how land is broken down in one place but built up elsewhere. Children probe their science textbooks and related curriculum materials.	Probe pupil investigations from Concepts in Science IV to form concepts on how land or earth changes are gradual and unobservable except for landslides, floods or earthquakes and to understand how change takes place constantly. See p. 221 An investigation into how water moves land p. 225 An investigation into freezing water pp. 226-227 The force of ice p. 231 An investigation into the force of sprouting seeds p. 232 An investigation into what happens when plants grow pp. 235-238 An investigation into moving water pp. 240-241 Holding land and water p. 242 An investigation into how leaves help to hold soil p. 243 Saving our soil -What can we see about us as evidence that the earth is changing? -How have we played a role in causing erosion to occur? -How can we prevent erosion?	Children observe upon changing ph the environment Children discrim man-made changes ecological chang Children project of man's alterin ronment.

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SUPPORTING CONCEPTS

LEVEL II-4

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMI PERFO
Children investigate the properties of air to develop the understanding that oxygen is essential for man and animals, carbon dioxide is essential for plant growth and to discover their interdependence.	Have children bring in all recent articles or materials on air pollution. Have them classify the various kinds of pollutants which appear in the air. Note how there is no "pure" air and that some forms of pollutions are necessary for the balance of life such as carbon dioxide for plant production. Have children experiment at night with a flashlight by beaming a strong light upwards. Note dust particles in air. Shake dust mop or blow dust from furniture and observe how particles of dust float and finally settle downward. Discuss how droplets of water "collect" particles from the air and return it to land. Children capable of in-depth research can locate other pollutants such as sulfuric oxide (from coal burnings) fragments of solids from earth's surface carbon monoxide (cars and machines burning fossil fuels) and, chemical pesticides. Display through bulletin boards the various findings. -In what ways are newspapers and periodicals helping us be aware of our polluted environment? -What kinds of air pollutants and how much of them are not lethal or necessarily harmful to the human organism? -What kinds of pollutants do we put into the air daily in the classroom or at home? (A) The children can create a cartooned newsette which would depict what possible effects polluted air can have upon their lives. Include such ideas as: pollutions have killed people (London, Donora, Pa. incidents); it can cause health problems such as emphysema and lung cancer; it can be the cause of neurological and psychological disorders; and possibly it can have genetic effects on unborn children.	Children activel of pollutants on port their findin class. Children use appr pollution termino press their idea Children examine role as contribut pollution and sho of an act or acts flect responsibl decrease their co share.

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SUPPORTING CONCEPTS

LEVEL II-4

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMIN PERFOR
	-What effects might air pollution have on animals? -What kinds of damage is done on plant life? -How much toxicity can the human organism tolerate? (A) Children can create songs, slogans or poems to express their awareness and concern for cleaner air. (A)	

EPTS

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ECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-4

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Green plants are basic for the supply of oxygen. Children will analyze the characteristics of a small city and a large city and will attempt to describe what happens to the source and supply of oxygen as the size of a city grows.	Have children review and recall the oxygen and carbon cycle charts and discuss the contribution of one to the other for living organisms. Start a cartoon strip in which there is only one house among an ecologically balanced natural environment. Increase houses progressively with additional polluters, cars, planes, factories, sewage disposals and people. Eliminate number of trees, grassy areas, streams, air space and animals. Display a large bulletin board with "From this -- to this?" or with a similar idea which depicts how man has slowly altered his habitat and in turn upset the carbon-oxygen cycle. -Where did our oxygen come from in the first scene? -Where does it come from in the last scene? -What else besides oxygen are we breathing? -How are our bodies adjusting to the additional particles in the air? -What illnesses are more prevalent as a result of pollutant air? (see earlier lesson on air) -How can we introduce green plant life to reverse choking patterns? -What could happen if we choose to do nothing about our environment? -What is happening in growth change in our community? -Can we become like the people in our last scene? -What can we do with green plants today to prevent the last scene? (En-A)	Children rev ecological b oxygen and c help clarify of man's alt Children dis standing fo on green pla by suggestin for pattern which would duction of i life as par growth of a Children sho internalizi of the conc and contras community wi and by provi for conserva velopment o life produc Children di ity for the avoiding de plant life and at home ting in act hance the o

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VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
sic for the ze the char- all city and il attempt ppens to ly of oxygen ty grows.	Have children review and recall the oxygen and carbon cycle charts and discuss the contribution of one to the other for living organisms. Start a cartoon strip in which there is only one house among an ecologically balanced natural environment. Increase houses progressively with additional polluters, cars, planes, factories, sewage disposals and people. Eliminate number of trees, grassy areas, streams, air space and animals. Display a large bulletin board with "From this -- to this?" or with a similar idea which depicts how man has slowly altered his habitat and in turn upset the carbon-oxygen cycle. -Where did our oxygen come from in the first scene? -Where does it come from in the last scene? -What else besides oxygen are we breathing? -How are our bodies adjusting to the additional particles in the air? -What illnesses are more prevalent as a result of pollutant air? (see earlier lesson on air) -How can we introduce green plant life to reverse choking patterns? -What could happen if we choose to do nothing about our environment? -What is happening in growth change in our community? -Can we become like the people in our last scene? -What can we do with green plants today to prevent the last scene? (En-A)	Children review and recall ecological balances of the oxygen and carbon cycle to help clarify the consequences of man's altering his habitat. Children display the understanding for our dependency on green plants for oxygen by suggesting alternatives for patterns of city growth which would involve introduction of increased plant life as part of the necessary growth of a city. Children show evidence of internalizing the importance of the concept by comparing and contrasting their present community with a large city and by providing suggestions for conservation and for development of green plant life production. Children display responsibility for their environment by avoiding destruction of green plant life on school grounds and at home and by participating in activities which enhance the oxygen cycle.

SUPPORTING CONCEPTS

LEVEL II-4

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMI PERFO
Through investigation and conducted experiments, the children will attempt to validate the question as to whether plant life is affected by noise levels.	Take three similar inexpensive potted plants (geranium) and place two near the source of phonograph, radio or taped music whose volume can be controlled. Place the other out of range of sound. Play recorded sounds on very high volume. (Make sure child's mother agrees to "hear out" experiment if conducted at home.) Some schools have sound proof rooms in music departments to muffle sound. Keep a chart or log on length of time sound was played, the number of days of the experiment and weekly results of condition of exposed plants as compared with the controlled plant. -What condition is the texture or firmness of plant in as experiment progresses? -What happens to the leaf color, flower color? Remove one of the two plants (which by now should show evidence of weakness and decay) and nurse it back to health with the other plant removed from the sounds. -Is the plant permanently damaged? -Does the appearance of the plant change? -Can a plant be nursed back to health after exposure to high level sounds? -What implications has this for human beings? (A)	Children show con continued high no Children seek cau unnecessary sound Children show awa inside sounds and sounds and its me healthy environme trolling the soun they participate

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SUPPORTING CONCEPTS	A.	Life converts matter and energy into characteristic species form.
LEVEL II-4	B.	Men interact to utilize the world's available resources.
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
Children will demonstrate their responsibility to the environment by continuing to probe into the cause and effect of air pollution.	Probe pupil investigations from Concepts in Science IV to understand how they and all other living things are part of a oxygen-carbon dioxide cycle and how children capture matter for the environment and how they return it. See p. 101 An investigation into a way of collecting air pp. 104-105 An investigation into oxygen and air p. 113 An investigation into disappearing molecules p. 120 An investigation into the air you breathe p. 125 An investigation into a plant under water pp. 126-128 . The carbon dioxide-water cycle -Why do we need oxygen? -How does modern technology "foul" our air? -When does carbon dioxide become a "pollutant" rather than an essential part of the oxygen-carbon cycle? -How do green plants keep the cycles in balance? -Note observable air pollutants in the neighborhood. (A)	Children observe a normal carbon- with a "pollute discuss the cons their observatio Children partici periments to in into how necess life. Children refine ception of obse seeking and rep sights and scen were unaware of Children seek a promote "health ments in which can survive.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMI PERFO
Communities reflect environmental care. Children investigate and determine what their own community contributes in natural resources, what it consumes in quantity and whether abuse in acquisition is apparent.	After assigning the investigation of neighborhood activities to various "reporters", the children return with information, (which can be recorded by charts, transparencies, cartoon strips, etc.), which will reveal the answers to the following questions: -What kinds of natural resources does our community have? -What kinds of commerce or industry are using basic raw resources and what kinds are utilizing converted or refined resources? -What does the manufacturer or industrialist do with wasted material? -Are there by-products? -Are they recycled? -Are they discarded? -Are materials given away? -Is there evidence of abuse of the environment? -Is there evidence that they are making an effort to prevent environment pollution? -How are the citizens showing approval of activities of conscientious manufacturers, industrialists and producers? -How can we participate in being useful citizens to prevent wasteful products? (En)	Children indicate they perceive env abuse by the kind porting" they mak class. Children's percep sight is refined are asked to see with a sophistica that demands answ challenging quest Children display bility for savin resources by sugg actions which wil their own motive abuse of product daily utilize.

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SUPPORTING CONCEPTS

LEVEL II-4

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C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
Man, through cultures, respond to the environment. Through Social Study activities, children collect specific data to support the evidence that the early settler abused the environment by a too rapid utilization and exploitation of the forests and prairies.	View the audio-visual media (films, charts, art prints, etc.) which will illustrate to the children how the early settlers responded to their environment. -How did clearing forest lands of agricultural plans affect our watersheds and erosion of soil? -What happened to all our great numbers of American Bison (buffalo)? -In how many instances did the Indians and the early settlers exploit the land and then moved on to more fertile soil? -How differently did the Indians and the early mission fathers use the environment? -In what ways did the rancheros use and abuse their grazing lands? -For what reasons were countless animals killed, in which pelts were saved and the rest of the animal discarded? -Are we still perpetuating these activities for the same reasons? (En)	Children make skills of res seek data to dence that th abused their through explo Children defe which indicat ronmental abu tial, for tha time, for sur Children ques validity for abuse today.

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
View the audio-visual media (films, charts, art prints, etc.) which will illustrate to the children how the early settlers responded to their environment. -How did clearing forest lands of agricultural plans affect our watersheds and erosion of soil? -What happened to all our great numbers of American Bison (buffalo)? -In how many instances did the Indians and the early settlers exploit the land and then moved on to more fertile soil? -How differently did the Indians and the early mission fathers use the environment? -In what ways did the rancheros use and abuse their grazing lands? -For what reasons were countless animals killed, in which pelts were saved and the rest of the animal discarded? -Are we still perpetuating these activities for the same reasons? (En)	Children make use of their skills of research as they seek data to support evidence that the early settlers abused their environment through exploitation. Children defend positions which indicate that environmental abuse was essential, for that period of time, for survival. Children question the validity for environmental abuse today.

SUPPORTING CONCEPTS

LEVEL II-4

A. Life converts matter and energy into characteristic species form.

B. Men interact to utilize the world's available resources.

C. Cultures are characterized by their special ways of reacting to the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Argicultural technology is dependent on the values man chooses to enhance. Children weigh and criticize the importance of agricultural technology to the wealth of nations and its meaning for what it does to the dignity of man.	Children scan the social science textbooks and library materials on the early lives of California Indians, missions and rancheros to recall and review how food was grown and raised by manual labor. Have them note the dependency on soil conditions and climate which determined their crop production. Review the hard conditions and climate which determined their crop production. Review the hard conditions under which man survived. Because man has increased his technological know-how, machines have released man from heavy labor, have increased his crop production and have enabled him to experiment in crop rotation, fertilizers, pesticides, land clearance programs and in irrigation projects which has altered the environment, increased the quality of food production and in general raised the standard of living. Have children depict the scenes of yesteryear with those of today through art media and sociodrama. -How much more can one man produce today than one man could yesteryear? -What does he do with his surplus? -In what ways is he supporting the "have-nots"? -How does man choose to care for or abuse his land? -What choices can he make with his crop production? -What responsibilities does he have for other men? -What evils has agricultural technology created? -How better are our lives because of it? (En)	Children size agr of today the world Children the produ supply b in societ necessary Children for the "have-not the choic distribu Children sibility need to ronment to receiv mother ea

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
s de- ze ural f r y	Children scan the social science textbooks and library materials on the early lives of California Indians, missions and rancheros to recall and review how food was grown and raised by manual labor. Have them note the dependency on soil conditions and climate which determined their crop production. Review the hard conditions and climate which determined their crop production. Review the hard conditions under which man survived. Because man has increased his technological know-how, machines have released man from heavy labor, have increased his crop production and have enabled him to experiment in crop rotation, fertilizers, pesticides, land clearance programs and in irrigation projects which has altered the environment, increased the quality of food production and in general raised the standard of living. Have children depict the scenes of yesteryear with those of today through art media and sociodrama. -How much more can one man produce today than one man could yesteryear? -What does he do with his surplus? -In what ways is he supporting the "have-nots"? -How does man choose to care for or abuse his land? -What choices can he make with his crop production? -What responsibilities does he have for other men? -What evils has agricultural technology created? -How better are our lives because of it? (En)	Children analyze and synthesize agricultural technology of today and compare it with the world of yesteryear. Children display respect for the producer of our food supply by accepting his role in society as a noble and necessary one. Children display awareness for the food needs of the "have-nots" by examining the choices society makes in distributing surplus supplies. Children examine the responsibility role the producers need to have for their environment in order to continue to receive benefits from mother earth.

SUPPORTING CONCEPTS

LEVEL II-4

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION
Man-made environments are evidences of man's values. After investigations through committee work, children will outline examples of man-made environments and the role of responsibility man has assumed.	Have children collect picture articles from news media or periodicals which illustrate man-made environments-building, (city, parks, railways, reservoirs, airports, etc.). Group into committees to explore and discuss the following questions: -How has the man-made environment contributed to aesthetic surroundings? -What are urban slums and ghettos? -Who is responsible for beauty-the government, the public, or ourselves? -What are we doing to renew our man-made environment? -What does urban renewal mean? -How does surfaces made of asphalt or cement affect our "water cycle"? -How can we make parking lots be more park-like so that there is aesthetic beauty, ecological balances (trees, soil absorbtion of water, etc.) and economic feasibility? (En) Create an aesthetic environment utilizing ecological factors of interdependence and economic feasibility. Each group select own environment such as an airport, a parking lot, a shopping center, etc. Justify your man-made environment. (En)	Children value jud principle evidenced ment. Children man-made reflects what is n environmen appeal an feasible.

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CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	Create an aesthetic environment utilizing ecological factors of interdependence and economic feasibility. Each group select own environment such as an airport, a parking lot, a shopping center, etc. Justify your man-made environment. (En)	

SUPPORTING CONCEPTS

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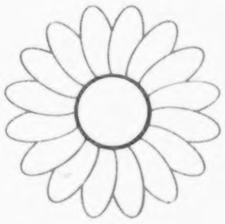
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION
Children continue to develop proficiency in craftsmanship in aesthetic arts and music forms to reflect improvement of the environment through aesthetic skills.	Have children choose their own artistic media in which they can express their craftsmanship which depicts their understanding of society's cultural components as it relates to the environment, (music, dance, poetry, art, etc.). -In what ways does man develop his varieties of culture which interact with his environment? -How does the environment influence the development of cultural forms? -How does it inhibit man's cultural development? (En)	Children ex creative fo pretations result or i environment Children se of "externa the environ is mainly a dollars and



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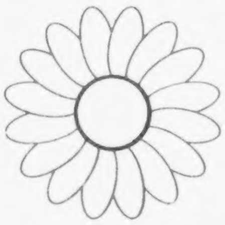
TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Have children choose their own artistic media in which they can express their craftsmanship which depicts their understanding of society's cultural components as it relates to the environment, (music, dance, poetry, art, etc.). -In what ways does man develop his varieties of culture which interact with his environment? -How does the environment influence the development of cultural forms? -How does it inhibit man's cultural development? (En)	Children express through creative forms their interpretations of culture as a result or influence of their environment. Children seek understanding of "externalities" that is, the environment whose value is mainly aesthetic, not dollars and cents.



NOTES

LEVEL II$_5$

A. The environment is in continual change, in present and past ages.

B. Social aims determine the utilization of resources.

C. Men create objects, events and behaviors which satisfy their images of beauty, or order.

SYMBOLS

L - Land	A - Air	W - Water	EC - Ecology, Plants and Animals	EN - Environment, Population

SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	E
Change is perceptable in a child's environment. Through classroom investigations, children study and probe the ecological forces which contribute to the changing of the earth's surface and biosphere.	Probe pupil investigations from Concepts in Science V to discover what forces at work are changing the earth's surface. See p. 4 An investigation into the force of ice pp. 6-8 A saw of water pp. 8-9 Plants at work pp. 11-14 Building up the land p. 15 Making a model: layers of sediment p. 22 Making a model: a model of the earth p. 23 Inside the earth pp. 31-34 Up over a mountain pp. 35-37 Treasure beneath your feet p. 38 An investigation into making crystals pp. 41-42 The look of changed rocks -How do we think the earth began? -How does rock change into soil and back to soil again? -In what ways does the weather alter the earth's surface? -What is the earth made of and how can we prove it? -Are our "treasures of the earth" limited? How fast are we using them up? -In what ways are man increasing the speed of the earth's changes? -In what ways do I contribute to this rate of change? -What is the "land cycle"? (L)	Ch in th of na Ch cy es co br en gr ma Ch ro th

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
Children perceive and record physical changes in their immediate (school) environment, and whether the changes are enhancing or depriving the school values.	Walk around the school grounds and record through words or pictures the physical changes taking place there. -Are there evidences of faults or unusual rock formations? -Is the lawn brown and dry or green and moist? -Are plants green and clean or dusty and broken? -Is there weeds or grass under fence lines? -Are there footpaths worn on the ground by children's walking patterns? -What conditions are the trees in? -Are there holes or mud puddles where water has worn away the soil? -In what conditions are the banks or walkways in? -How many of the conditions are due to natural forces and how many are due to man-made situations? -How do these changes reflect upon our school pride? -Can we alter any of the conditions? How? (En)	Children perceiv criminate betwee and man-made cha environment. Children partici planning for cha hance the appear school site. Children partici changes.

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Children perceive and record instances of physical change in their home and community environment and whether the changes are enhancing or depriving home and community values.	Walk about the community or assigned locations near children's homes to visit. Look for signs of environmental changes which reflect actions by natural forces of wind, weather, heat and rain. Note those due to changes made by man in constructing and building his work and living sites. Record examples by photography, sketching or voice recording. -Are streams or rivers blue, green, brown or multi-colored? -To what do we attribute its appearance? Can we find out? -Are there evidences, geologically apparent, such as faulting, diking or flooding? Are fossils discovered? -How far and clear is the atmosphere's visibility? -Does there appear to be a cast or color to the air? -Are the atmospheric conditions different during different climatic conditions? Log, film or sketch for future comparisons. -If smokestacks are in view note the pattern of the smokes direction after reaching its peak. Where does it go next? -Are trees, plants and shrubs browning and dying near factories, near freeways, or near noisy areas? Are some plants more sensitive to carbon monoxide, sulphur oxide or any of the number of pollutant particles in the air? (En)	Children environm ceived n communit of natur Children to man' and deve Children and comp improve

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
ord nge ty he de- y	Walk about the community or assigned locations near children's homes to visit. Look for signs of environmental changes which reflect actions by natural forces of wind, weather, heat and rain. Note those due to changes made by man in constructing and building his work and living sites. Record examples by photography, sketching or voice recording. -Are streams or rivers blue, green, brown or multi-colored? -To what do we attribute its appearance? Can we find out? -Are there evidences, geologically apparent, such as faulting, diking or flooding? Are fossils discovered? -How far and clear is the atmosphere's visibility? -Does there appear to be a cast or color to the air? -Are the atmospheric conditions different during different climatic conditions? Log, film or sketch for future comparisons. -If smokestacks are in view note the pattern of the smokes direction after reaching its peak. Where does it go next? -Are trees, plants and shrubs browning and dying near factories, near freeways, or near noisy areas? Are some plants more sensitive to carbon monoxide, sulphur oxide or any of the number of pollutant particles in the air? (En)	Children record and describe environmental changes perceived near and in their community which is a result of natural physical forces. Children describe changes due to man's search for growth and development. Children's ability to contrast and compare are utilized to improve perceptual skills.

SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
Through review of concepts for man's basic needs, children continue to probe investigations on oxygen, dependency on green plants, and the exchange of goods and services between animal and plant life in order to survive.	Probe pupil investigations from Concepts in Science V to strengthen their understanding of how green plants capture the radiant energy of the sun and how the green plants store this energy in forms of fuel, foods and fibers. See p. 235 An investigation into what happens to a geranium leaf in light p. 239 An investigation into a sealed-in plant pp. 243-245 We seal in a fish and cow p. 249 From environment into body pp. 252-255 Cells that build our fuel supplies p. 257 Cells that make clothing p. 258 An investigation into identifying wool and cotton p. 259 An investigation into cotton and wool under the microscope -How do plants produce the essential foods for man's survival such as fats, carbohydrates, proteins and vitamins? -How do green plants become fossil fuel? -Are fossil fuels limitless? Is our consumption rate greater than the earth's supply? -What ingredients are necessary for photosynthesis to take place? (CO_2 + water + chlorophyll + sugar + oxygen). -How is man's altered environment (soil, erosion, irrigation, stream and river pollution, etc.) altering the green plant "factory"? (Ec)	Children part science inves increase the concern for a environment. Children seek man's action environment a the values ma these alterna

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IVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
concepts for children investiga- ependency nd the ex- d services plant life e.	Probe pupil investigations from Concepts in Science V to strengthen their understanding of how green plants capture the radiant energy of the sun and how the green plants store this energy in forms of fuel, foods and fibers. See p. 235 An investigation into what happens to a geranium leaf in light p. 239 An investigation into a sealed-in plant pp. 243-245 We seal in a fish and cow p. 249 From environment into body pp. 252-255 Cells that build our fuel supplies p. 257 Cells that make clothing p. 258 An investigation into identifying wool and cotton p. 259 An investigation into cotton and wool under the microscope -How do plants produce the essential foods for man's survival such as fats, carbohydrates, proteins and vitamins? -How do green plants become fossil fuel? -Are fossil fuels limitless? Is our consumption rate greater than the earth's supply? -What ingredients are necessary for photosynthesis to take place? (CO_2 + water + chlorophyll + sugar + oxygen). -How is man's altered environment (soil, erosion, irrigation, stream and river pollution, etc.) altering the green plant "factory"? (Ec)	Children participate in science investigations which increase their knowledge and concern for and about the environment. Children seek and analyze man's action to alter his environment and to discover the values man places on these alternations.

SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
Through study of history, children describe changes in rate of growth of population in the United States and the local community.	Scan and review almanacs and books on population growth (see appendix) to locate population growth rates. Compare information with Social Studies textbooks to analyze the rate of growth and the need for this growth as part of our early development in American history. (En-Pop) Simulate an early community by listing all the necessary jobs and people needed (butcher, baker, farmer, blacksmith, etc.) Assign 5 people in the room to do all the tasks necessary. Increase the task force to 10 people and finally involve the total class. -How man jobs are left undone if only a few people are available? -How did division of labor with increased workers help raise the standards of living? -How many workers are just enough to support community life? -What is meant by carrying capacity? (see appendix) -How will the community change when population increases beyond carrying capacity? -Are the needs for increased population growth the same today as it was during our early developmental periods? How different are the needs today? (En-Pop)	Children integr needs for incre growth by gathe support the con Children explai the need by vic ulated activiti Children questi of and needs fo growth today.

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
An understanding of "population pressure" is made more meaningful through investigations of plant and animal life in which the carrying capacity of the ecosystem is overloaded.	Children can raise carrots, radishes or grass seeds in flats or pots with controls on the number of seeds planted under uniform soil conditions. One flat may contain evenly spaced seeds recommended on seed packages. Another may contain double the amount of seeds suggested on the package. A third may contain extremely crowded conditions. Observe, record and analyze data on various growth stages. -Do all the seeds appear to grow uniformly? -Are some being crowded by others? -What is the appearance of those plants which are properly sowed as contrasted with those overly crowded? -What is meant by "carrying capacity" of the flat? (Ec-Pop) If an aquarium is available experiment with increasing population of guppies and note behaviors, activities and optimum carrying capacity. (Ec) Illustrate experiments through art media. Discuss the relationship of carrying capacity in the human ecosystem with that of plant and animal carrying capacities in their ecosystems. (Ec)	Childre vestig to summ populat for mar Childre for li differe Childre man's

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Children gather further evidence of changes, through activities such as photographing, sketching or related artistic activities to support reasons for desirable or undesirable changes in the environment.	Through various devices such as photography, films, filmstrips, slides, sketching, modeling, etc. - children record scenes from their community which reflect environmental changes. The observations may be time lapsed so that significant changes may be evident. The observations may be just evidence which is producing change before their eyes (i.e. soil erosion during heavy rainfall, forest or building burning before their eyes or sights such as factory or industry emission of waste products into streams or rivers nearby and its journey downstream. -What are we "seeing" now which our eyes were not trained to see before? -How do we feel about what we are observing? -What will the consequences be to our future if we take no action towards rectifying those activities we consider detrimental to our environment. (En)	Children artistic their ob and incr ronmenta Children their fe about de sirable

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
Children begin to assume responsibility for changes by joining clubs or groups whose primary or immediate goal is to be concerned for changes in the environment.	Look in the local newspapers, chamber of commerce, boys clubs, YMCA and its affiliates and in local PTA newsettes to locate and identify those groups, clubs or organizations which are participating in environmental actions. Suggest that the children list and outline plans of actions taken by the community. If nothing is available begin an environmental study group. (See the appendix for listed involved organizations.) -What are the goals of the group? -How do they plan to accomplish their goals? -How can one become a member? -If the children are part of an organization which has not started an environmental awareness or action group, have them initiate activities which will get others involved. -How economically feasible are their actions? -What can we do to change peoples habits? (En)	Chil bil. by j grou ties the unde fact pres envi conc to g ment

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C. Men create objects, events and behaviors which satisfy their images of beauty, or order.

TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Look in the local newspapers, chamber of commerce, boys clubs, YMCA and its affiliates and in local PTA newsettes to locate and identify those groups, clubs or organizations which are participating in environmental actions. Suggest that the children list and outline plans of actions taken by the community. If nothing is available begin an environmental study group. (See the appendix for listed involved organizations.) -What are the goals of the group? -How do they plan to accomplish their goals? -How can one become a member? -If the children are part of an organization which has not started an environmental awareness or action group, have them initiate activities which will get others involved. -How economically feasible are their actions? -What can we do to change peoples habits? (En)	Children assume responsibility for their environment by joining an environmental group or initiating activities in local groups in which the primary goals are to seek understanding of ecological facts, to undertake action to preserve and protect healthy environments and to eliminate conditions which contribute to pollution of the environment.

SUPPORTING CONCEPTS

LEVEL II-5

A. The environment is in continual change, in present and past ages.

B. Social aims determine the utilization of resources.

C. Men create objects, events and behaviors which satisfy their images of beauty, or order.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
Children will study and compare the customs of cultural groups (Indians, pioneers, etc.) in the United States which determine how natural resources will be utilized.	Take whichever cultural group of people is being studied, such as pioneers, pilgrims, Indians, and analyze their customs relative to the natural resources they are using. -Did their society call for metal from the earth? -Did they rely on wood from trees for building or dye from plants for communication and dressmaking? -Where did they get their sources of light and heat energy? (oil from whale, wax from bees, fire from wood, etc.) -What kinds of their cultural activities required the utilization of natural resources? (churches, Indian bonfires, celebrations-ceremonies). -How did they abuse, if at all, their environment? -Did their sources appear to be limitless? -When their resources gave out what did they do? (move to another site) (En)	Chi tha uti men res Chi did lem fac air spa and wer ear

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SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
Rules and laws determine the utilization of resources. Children will examine their local community laws and rules to discover and list which laws pertain to conservation or redemption of pollution to its natural resources, if any.	Laws which regulate environmental quality in California is described comprehensively in California Environmental Law, A Guide (see appendix). It lists public agencies, general and specific laws from the various codes and also from the specific categories of air, water, landuse, solid waste, noise control and pesticides and radiation. The book could be used in the same manner as an encyclopedia or reference book in which facts are looked up as need arises. Exercises in research skills may be assigned from Language Arts in this book as it would from any other sources used for the same purpose. -How has the federal law on environmental quality affected state laws? -Which agency is responsible for air, water, land, etc.? -Are any of the passed laws or bills being enforced in our community? -What laws do we know about directly affect our daily living? -What kinds of reviews about law enforcement are the newspapers and periodicals covering? (En)	Chil for by s and exis Chil supp ronme for

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SUPPORTING CONCEPTS

LEVEL II-5

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Children will simulate a political body in the community whose responsibility is legislation and then design a body of laws which would reflect conservation of our natural resources, redemption of polluted environment and the prevention of further pollution.	Groups can be divided into legislative bodies of two or three "communities". Decide what kinds of industrial or pollutant problem each community has. Let each group set up bills to enact into law and debate the following three questions: -For our community, will these bills be: -economically feasible (can we afford it?) -socially acceptable (will people live with it?) -a political reality (can we make it work legally?) -For our nearby community (ies), will these bills be acceptable: -How will it conflict with their plans of action? -Will it cause pollution problems for them? -Will intra-communities problems arise? -How much concern shall we have for our neighbors? -Do we need common laws to meet all our needs? -Write up a "Bill of Responsibilities for the environment" and display it in Social Studies Areas. (En)	Childr to fun displa which about Childr decisi make t viable Childr for li enviro lyzing issues for th

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Children simulate activities in business or commerce settings which will help them to work through reasons for being involved with environmental improvements and to seek answers as to why people need to cooperate with each other's daily work in order to maintain a healthy environment.	Create business groups whose goals are profit-making in intent but who choose to donate part of their profits to increase environmental improvements. -How do we decide how much to give to environmental groups or agencies? -What is there in it for us? -Why should we give our profits away? -How can we make the community want to use our donations wisely? -Have groups of people in history that we have studied donated their time, talent or money for environmental improvement? -If yes, how? If not, why start now? (En)	Children rol problems of what a busin and says to ings for coo community an Children rec data which r man was conc environment. Children rai about the ro man in the c concerns his

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
The environment is a source of aesthetic appeal to the child. Children study their environment to determine which objects, events and behaviors enhance or deprive their aesthetic values.	If possible have children photograph sites and scenes which reflect objects of beauty and those which reflect abuse or degredation of the environment. Sketch or record verbally scenes as an alternative. Note and record initial feelings about what they saw. -What kinds of things in the environment make me feel good inside? -What kinds of sights make me feel disgusted? -Were there anythings in an "ugly" environment which were beautiful and which can be salvaged or increased? -Does our neighborhood have eyesores? -Is there anyway we can do something to eliminate them? -What sights can we be most proud of? -Whom can we give compliments to for promoting environmental beauty? -What can we do to beautify our classroom, schoolground, or homes? (En)	Children seek between functi thetic appeal hood sights. Children disc late scenes w ings of accep rejection to appeal. Children inve ities to crea sights in the

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Children examine their textbooks and library resources to identify ways in which people choose to preserve the aesthetic qualities of the environment as the growth of the United States develops.	Have children check their social studies textbooks and library resources periodically to find data which support the evidence that man has or has not been concerned over the aesthetic qualities of his environment. -Did people in the early history of the U.S. need to have concern over whether they had peaceful or restful scenery to view? -How did increase in population alter town streets or country roads? -What factors contributed to the ugliness of todays crowded, overburdened cities? -How did town squares, bowling greens, and city parks reflect the concern of early city fathers decisions about the environment? -Illustrate early forms of aesthetic environments. (En)	Childre book re concer opment cities Childre increas growth commerc city fa of conc increas Childre art med life lo tionshi ronment

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATIO
Children describe and discuss the consequences of pollutants on land, air and water to their aesthetic values and whether alternates are available.	Hold panel discussions on how we feel about what we see is being done on the environment. Take positions "It does not matter, we have been doing this all along" versus "It does matter, it affects me this way." -How peaceful can one feel when garbage and sewer smells permeate the air? -How joyful can we feel when every breath forces us to cry or gasp? -What feelings do we have when our eyes tell us about a repulsive sight? -Can we work or play in an unhealthy environment which does not allow our "souls" to expand or to express our inner feelings? -How can we preserve an environment for pure enjoyment of our senses? (En)	Children e feel about dards of q air and wa Children v feelings w their atti thetic qua environmen Children s their role to an unpl and sugges alter thei be more pl and to fee

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LEVEL II_6

A. Man is the prime agent of change of the "natural" environment.

B. Man modifies the environment in order to utilize his resources--and increase them.

C. Men recreate the environment.

SYMBOLS

L - Land
A - Air
W - Water
EC - Ecology, Plants and Animals
EN - Environment, Population

SUPPORTING CONCEPTS

LEVEL II-6

A. Man is the prime agent of change of the "natural" environment.

B. Man modifies the environment in order to utilize his resources--and increase them.

C. Men recreate the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Man alters, exploits and if not wise, exterminates his environment. Through probing pupil investigations in Science textbooks children discover that man is an agent of change and can alter his environment to capture sources of energy to invent machines using natural resources to reduce the burden and struggle of life and to improve upon scientific and technological developments.	Probe pupil investigations from Concepts in Science VI to discover how man has learned to use the treasures of the earth through the development of science and technology and consequently alter the environment in which he lives. See pp. 53-55 Ideas and tools: relations in discovery p. 58 An investigation into a motion of a molecule p. 59 An investigation into the nature of heat pp. 68-71 The uses of ideas and tools: new metals p. 72 An investigation into getting metal from its compound pp. 85-90 Improving on a moth -Animals and plants must live in their environment or become extinct. How has man changed his environment to suit his needs? (submarine, spaceship, new machines, new materials, etc.) -How did the discovery of atoms and elements alter his way of living? -How do we change our environment when the weather turns very hot or very cold; or when it gets dark outside or when we want work done for us with other than physical energy? -What kinds of problems have arisen as a result of increased wants and desires of energy? (Ec)

PTS

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CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
In order for man to increase his efficiency in altering his environment, he relies on the principles of simple machines and the concept of the sequence of radiant energy (sun) to stored chemical energy (plants) and to mechanical energy (man and machines). Children probe their sceince textbooks and library resources for increased perceptions of how work is done.	Probe pupil investigations from Concepts in Science VI to synthesize the concept of work force x distance and the source for energy needed. (energy sources & conservation) See pp. 155-156 An investigation into an inclined plane as a simple machine p. 157 An investigation into another simple machine, a lever p. 162 An investigation into the location of the fulcrum p. 167 An investigation into the use of a pulley p. 169 An investigation into using a block and tackle p. 173 An investigation into a winding inclined plane p. 181 An investigation into the force of friction p. 185 An investigation into how a simple machine multiplies force -What kinds of simple machines can we see operating in our classroom, our home or neighborhood? -How are they affecting the environment? Wise use or abuse? -How much change is necessary? -Who decides how much change is to be made? -Who pays the price for change? -Where is the source of energy for the operation of the various machines? -What resources are being sacrificed unnecessarily? (Ec)	Children displ ceptions throu scientific inv about man's re theories of th chines to incr ciency in alte ronment. Children weigh increased chan taking place i ment with the the results.

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SUPPORTING CONCEPTS

LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Children seek information to develop concepts about nuclear energy, to explain the need for nuclear power plants and to justify or criticize the accusations made concerning thermal pollution to our waterways, by investigating science probes and through analysis and discussion of the children's findings.	Probe pupil investigations from Concepts in Science VI which allow children to develop generalizations about origins of nuclear energy, modern day use of it and its meaning for the environment in terms of thermal pollution. See pp. 286-288 Radium-a new concept of matter p. 289 An investigation into models of atoms p. 294 Making models: the atom p. 300 An investigation into detection of radioactivity p. 306 Making a model: a nuclear reactor pp. 308-313 Uses of nuclear energy -What is meant by nuclear energy? -How is it stored? -In what way does establishing nuclear power plants alter our environment? -What is thermal pollution? (water used as coolant which has raised the water temperature by 0-10 degrees and which is discharged into our waterways.) -How harmful is thermal pollution to aquatic plant and fish life? -Why are more nuclear plants being built? -How are our demands for more power contributing to increased building of plants? -Can we do without some nuclear energy? How? (Ec)	Children cated man mation ob investiga theory to living. Children, indicate ing of th pollution aquatic p Children their con expressio needs of plant bui

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C. Men recreate the environment.

	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
ion to nuclear need for nd to ne accu- thermal ays, by robes nd dis- n's	Probe pupil investigations from Concepts in Science VI which allow children to develop generalizations about origins of nuclear energy, modern day use of it and its meaning for the environment in terms of thermal pollution. See pp. 286-288 Radium-a new concept of matter p. 289 An investigation into models of atoms p. 294 Making models: the atom p. 300 An investigation into detection of radioactivity p. 306 Making a model: a nuclear reactor pp. 308-313 Uses of nuclear energy -What is meant by nuclear energy? -How is it stored? -In what way does establishing nuclear power plants alter our environment? -What is thermal pollution? (water used as coolant which has raised the water temperature by 0-10 degrees and which is discharged into our waterways.) -How harmful is thermal pollution to aquatic plant and fish life? -Why are more nuclear plants being built? -How are our demands for more power contributing to increased building of plants? -Can we do without some nuclear energy? How? (Ec)	Children act in a sophisticated manner towards information obtained from science investigations by applying theory to problems for daily living. Children, through reports, indicate a general understanding of the meaning of thermal pollution and its effects on aquatic plants and animals. Children review and analyze their contribution through expressions of wants and needs of increased nuclear plant buildings.

SUPPORTING CONCEPTS

LEVEL II-6

A. Man is the prime agent of change of the "natural" environment.

B. Man modifies the environment in order to utilize his resources--and increase them.

C. Men recreate the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Children recall past history of man's altering his environment by his activities of clearing forest lands for agriculture and hunting animals for food and fur.	Have children form committees in order to discuss, identify and then list ways in which man has altered his environment during the early settlement periods of our country. Have them list the reasons for man's actions (i. e. needed wood for canoes, homes, fences and furniture, therefore trees were cut down). -How much wood was needed? -Were any trees replaced? -Was any wood wasted? -Could man get all the wood he needed for survival? (En) Continue committee discussions on the need for clearing the forests for agricultural purposes; for hunting for otter, fox and bison, etc., for food and clothing; and for needed supplies which provided for their cultural and recreational activities. Make charts "Needed for Survival"--"Not needed for survival". -When land is not scarce, how careful is man in its use? -Why did many early settlers leave their "altered environment"? -In what conditions did they leave them? -How are the Latin American countries following in our footsteps in ravaging their environment? -In what ways are they contributing to environmental destruction? -Are there activities in which they are now attempting to conserve their environment? (See recent news articles). (Look for pictures from periodicals to justify your answer). (En) Create dioramas, diograms, charts or drawings which illustrate examples of exploitation of environments of	Children exami and decide wh stood whether or abusing his Children illus attitudes abou experiences an ed his environ Children compa Latin American they are study strate similar alterations to which is takin

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
story nvi- es of or ag- nimals	Have children form committees in order to discuss, identify and then list ways in which man has altered his environment during the early settlement periods of our country. Have them list the reasons for man's actions (i. e. needed wood for canoes, homes, fences and furniture, therefore trees were cut down). -How much wood was needed? -Were any trees replaced? -Was any wood wasted? -Could man get all the wood he needed for survival? (En) Continue committee discussions on the need for clearing the forests for agricultural purposes; for hunting for otter, fox and bison, etc., for food and clothing; and for needed supplies which provided for their cultural and [illegible] activities. Make charts "Needed for Survival"--"Not needed for survival". -When land is not scarce, how careful is man in its use? -Why did many early settlers leave their "altered environment"? -In what conditions did they leave them? -How are the Latin American countries following in our footsteps in ravaging their environment? -In what ways are they contributing to environmental destruction? -Are there activities in which they are now attempting to conserve their environment? (See recent news articles). (Look for pictures from periodicals to justify your answer). (En) Create dioramas, diograms, charts or drawings which illustrate examples of exploitation of environments of	Children examine past history and decide whether man understood whether he was using or abusing his environment. Children illustrate their attitudes about man's past experiences and how it altered his environment. Children compare or contrast Latin American cultures which they are studying to demonstrate similar or different alterations to environment which is taking place.

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	early settlers from the East as well as those coming up from the south from Mexico. Label art works such as "What it was like then" or "See it then" or "Tell it as it was" etc. -Is your creation a reflection of your attitude or values about how man abused his environment? -Is it only a description of what could have happened? -Are you telling a story of communicating a message? -Why did you choose one particular scene rather than another? Children can use Latin American scenes, as they know it today, to demonstrate their understanding of how man alters his environment in his daily need for survival. (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUA
Children identify and list ways man continues today to exploit the environment in order to maintain life such as irrigation of land, filling or black topping highways.	In his quest for increasing his standard of living and for providing goods and services for survival, man continues to alter, exploit and invade the environment. Have children use all of their available perceptual skills to record, photograph, sketch, or log scenes about them or scenes from T.V., periodicals and newspapers which illustrate examples of environmental alteration, (such as reducing open ground by highway blacktopping or irrigation of desert land for agriculture or stripping forests and ultimately watershed or building huge dams which destroy the ecology of plant and wildlife). -Are all these activities necessary? -In what way? -Who demanded them? -Can we continue our development forever? Why-Why not? -Are the Latin-American countries following our pattern or life style? Why or why not? -What must they have to equal our destructive or constructive example? (money, technology, manpower, etc.). [illegible] Filmstrips or cartooning are ways to record comparisons of what is happening and what can happen as a result of increased environmental changes. (En)	Childre ports a ronment have pr and tho to be b surviva Childre the ext the nee the env to wond much. Childre in othe demonst to alte cases e vironme

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
list ways exploit er to irriga- or black	In his quest for increasing his standard of living and for providing goods and services for survival, man continues to alter, exploit and invade the environment. Have children use all of their available perceptual skills to record, photograph, sketch, or log scenes about them or scenes from T.V., periodicals and newspapers which illustrate examples of environmental alteration, (such as reducing open ground by highway blacktopping or irrigation of desert land for agriculture or stripping forests and ultimately watershed or building huge dams which destroy the ecology of plant and wildlife). -Are all these activities necessary? -In what way? -Who demanded them? -Can we continue our development forever? Why-Why not? -Are the Latin-American countries following our pattern or life style? Why or why not? -What must they have to equal our destructive or constructive example? (money, technology, manpower, etc.). [illegible] Filmstrips or cartooning are ways to record comparisons of what is happening and what can happen as a result of increased environmental changes. (En)	Children give analysis, reports and ideas about environmental alterations which have proven to be exploitation and those which have proven to be beneficial to man's survival. Children question the speed, the extensive activities and the need for all changes in the environment. They begin to wonder how much is too much. Children look for examples in other cultures which demonstrate how man continues to alter, exploit and in some cases exterminate their environment.

SUPPORTING CONCEPTS

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LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Children begin to probe the effects of eutrophication of the environment through observation of his environment and simple experiments in the class.	Have two balanced aquariums (fish, plant, snails) set up in the classroom which children can examine daily. Introduce phosphates in one and note any changes in the plant life or increased algae. Have children review earlier experiments on aquariums in which sunlight was blocked out from one aquarium and as a result plants died and no oxygen was created. Have children discover how increased algae blocks out sunlight thereby killing plants, reducing oxygen supply for fish and the scavengers-the snails. (Ec) Look for news articles which cite examples from real lakes and streams which too much nutrient causes eutrophication (see glossary). -Why does algae grow so quickly? (increased nutrient-nitrates phosphate) -What will slow its growth down? Eliminate it? -How did extra phosphates get into the streams and lakes? -What role does detergents have in this? -In what way does the detergent industry react to public demands? For better or for worse? (Ec)	Children con with phospha them to refl unwise use c are water sc Children sho the industry omy's role i environment. Children see dence of man environment principle of

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
Children begin to probe the effects of biological magnification through simple experiments in the class.	Gather articles and reports on possible extinction of wildlife due to biological magnification (see glossary). Have students understand the principle by which pesticides build up in concentration as the animal is being eaten along the food chain by higher level predators. Have children refer to early food chains or have them each create a food chain cycle in which herbivores (plant eaters) consume plant treated with herbicides, (i.e., inchworm eating a plant); next a carnivore eats the first consumer, (i.e. fox, etc.). The same food web idea can be illustrated by water supply recieving pesticides which in turn is consumed by smaller fish, consumed by larger fish, consumed by water birds such as pelicans, etc. -Look for articles in recent periodicals or news media which predict danger levels of concentrated chemical pesticides. -What wildlife is already known to be on the list of endangered species? (pelican, various birds, bats, etc.) (Ec) To understand concentration buildup have children cut 1 inch squares of white paper on which you have placed a drop of colored tempera paint. This represents a given amount of pesticide. Have 4-6 children pretend to be the lower animals in the food chain who will each consume 10-15 white "spotted" paper as their food supply. Have two additional animals in the higher food chain divide the lower animals as their food supply. Record the increased concentration of pesticide the final consumers have absorbed. Increase the number of predators in the higher food chains until children understand the principle of biological magnification.	Chi int of Chi of ten it and

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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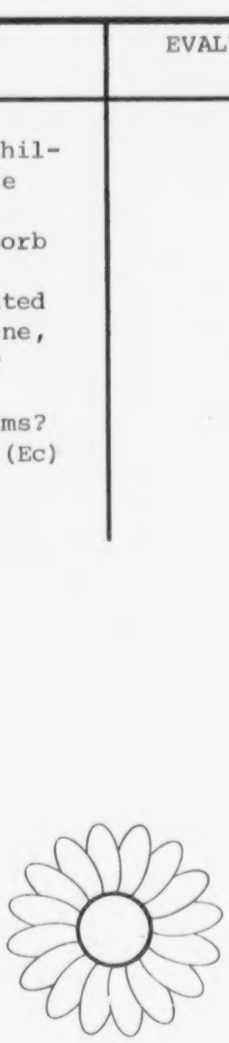
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Establish a danger level and a extinction level. Children may role play food chain activity in 2-3 minute skits. -How much chemical poisoning can a predator absorb or release from his system? -Are some synthetic pesticides such as chlorinated hydrocarbons-dieldrin, endrin, aldrin, toxaphene, heptachlor, etc. remain in the environment for years? (see appendix) -What shall we do to limit our pesticide programs? (Ec)	



SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PER
Man utilizes his skill of evaluation to seek direction for future actions about his environment. From observation, exploration and analysis children evaluate changed environments in their community in the area of pollution.	Have children read books (see appendix) about the pollution of the environment and select one area (land, air, water, wildlife, noise, population pressure) on which they will gather data, review facts and base opinion on their knowledge. Have debates or panel discussion on topics "for" and "against" the pollutant agent. -What is being polluted? -Who is doing the polluting? -How do we play a role in the pollution? -What have values to do with the problems? -How can pollution be stopped? -Is some pollution necessary? -When is pollution, pollution and when is it a necessity? (En) Have children write an essay or make a tape recording on their stand on what they see happening. -Are lakes drying up? -Are lakes choked with unwanted plantlife, or pesticides? -Have the temperatures of bodies of waters been altered? -Will the oceans be a king-size cesspool? -Will we need to wear face or gas masks in the 21st century? -Is there room to move, work, play and breathe for all? -Are other advanced technological nations following our footsteps? -Have deaths been caused by our apathy and carelessness? -Is anyone doing anything about the status quo? (En)	Children seek me investigating a the present con environment. Children look t and scientists what actions an are taking plac cannot observe Children begin consequences of in determining what we will do have learned ab relationship an dependence of o

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFOMRANCE
eval- for envi-	Have children read books (see appendix) about the pollution of the environment and select one area (land, air, water, wildlife, noise, population pressure) on which they will gather data, review facts and base opinion on their knowledge.	Children seek methods of investigating and evaluating the present conditions of our environment.
tion luate heir pollu-	Have debates or panel discussion on topics "for" and "against" the pollutant agent. -What is being polluted? -Who is doing the polluting? -How do we play a role in the pollution? -What have values to do with the problems? -How can pollution be stopped? -Is some pollution necessary? -When is pollution, pollution and when is it a necessity? (En)	Children look to researchers and scientists to understand what actions and activities are taking place which they cannot observe first-hand. Children begin to seek the consequences of our choices in determining how much and what we will do about what we have learned about our interrelationship and our interdependence of our environment.
	Have children write an essay or make a tape recording on their stand on what they see happening. -Are lakes drying up? -Are lakes choked with unwanted plantlife, or pesticides? -Have the temperatures of bodies of waters been altered? -Will the oceans be a king-size cesspool? -Will we need to wear face or gas masks in the 21st century? -Is there room to move, work, play and breathe for all? -Are other advanced technological nations following our footsteps? -Have deaths been caused by our apathy and carelessness? -Is anyone doing anything about the status quo? (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVA
Children begin to display responsibility for changing the environment in the classroom by activities representing their understanding of an unpolluted environment.	Search about the classroom and note the sections which are pleasing and those which are disturbing to the eye. List those which show evidence that are displeasing (dripping faucets, cracks in windows letting out heated air, dust on window ledges and on displays, broken pencils, scattered papers, etc.). List those which promotes a healthy environment. (Proper lighting, good ventilation, organization cupboards, bookshelves and desks, wise use of paper and storage, wise use of book distribution and utilization, etc.) -How can we participate in maintaining a pleasant and healthy room environment? -How are we contributing to polluting the environment? -Must we change our habits? In what ways? (En) Create posters, slogans, songs or poems which reflect or illustrate our feelings. (En)	Chil impr envi it m ful Chil expr thei ing pant alte

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CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
o display re- changing the he classroom presenting ing of an un- ment.	Search about the classroom and note the sections which are pleasing and those which are disturbing to the eye. List those which show evidence that are displeasing (dripping faucets, cracks in windows letting out heated air, dust on window ledges and on displays, broken pencils, scattered papers, etc.). List those which promotes a healthy environment. (Proper lighting, good ventilation, organization cupboards, bookshelves and desks, wise use of paper and storage, wise use of book distribution and utilization, etc.) -How can we participate in maintaining a pleasant and healthy room environment? -How are we contributing to polluting the environment? -Must we change our habits? In what ways? (En) Create posters, slogans, songs or poems which reflect or illustrate our feelings. (En)	Children suggest ways to improve or alter classroom environment which will make it more pleasing and healthful to live and work in. Children create artistic expressions to represent their growth in understanding their role as participants in room environment alterators.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Children take responsibility for planning programs in responsible behavior in the environment and utilize the relationship of interdisciplinary study in Science, Social Studies, and the Humanities.	Through a community effort children set up standards for their classroom environment and set those regulations which they feel are feasible and reasonable to expect children to perform and participate in. They list consequences for alternatives chosen which does not meet their standards. Weekly review is held of all infractions and of recognition of all deeds well done. -Are our standards socially acceptable (Can all live with it -Is it economically feasible (will we incur expenses because of our standards)? -Is it a political reality (are there any rules of the school which will be infringed upon because of our choices)? Display in a prominent place, the limits for activities and those which would exceed them. (En) Set up a "town hall meeting" in which 1) problems of our environment (in terms of our society) will be defined, 2) data will be gathered, proposal of solution made, testing of solutions be acted upon hypothetically and decisions made. -Do we know what our problems are? -What kinds of ecological facts do we have to support our hypothesis? -Have we thought of all the various groups in our community who will be affected? -Have we considered the economical consequences, the political possibilities and the social outcomes of our tentative solutions? -What role does aesthetics, beauty and values play in our decision making process? (En)	Children con before makin Children wei ically, soci as well as a fore testin problems an decisions a take toward lems.

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
nsibility ns in re- in the ize the erdisciplin- e, Social manities.	Through a community effort children set up standards for their classroom environment and set those regulations which they feel are feasible and reasonable to expect children to perform and participate in. They list consequences for alternatives chosen which does not meet their standards. Weekly review is held of all infractions and of recognition of all deeds well done. -Are our standards socially acceptable (Can all live with it -Is it economically feasible (will we incur expenses because of our standards)? -Is it a political reality (are there any rules of the school which will be infringed upon because of our choices)? Display in a prominent place, the limits for activities and those which would exceed them. (En) Set up a "town hall meeting" in which 1) problems of our environment (in terms of our society) will be defined, 2) data will be gathered, proposal of solution made, testing of solutions be acted upon hypothetically and decisions made. -Do we know what our problems are? -What kinds of ecological facts do we have to support our hypothesis? -Have we thought of all the various groups in our community who will be affected? -Have we considered the economical consequences, the political possibilities and the social outcomes of our tentative solutions? -What role does aesthetics, beauty and values play in our decision making process? (En)	Children consider alternatives before making decisions. Children weigh facts economically, socially, politically as well as aesthetically before testing solutions to problems and before making decisions about actions to take towards pollution problems.

SUPPORTING CONCEPTS

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Man's appetite for his resources increases. Children analyze man's motives for increased needs of renewable resources and what affects occur as a result of the choices he makes and actions he takes upon the utilization of these resources.	Divide class into groups or committees to gather information about the characteristics of renewable resources such as air, soil, water, plant life or fish. (See California's "Handbook on California's Resources). Analyze ways in which man uses each resource and why he chooses those ways. Include the need for increased use due to population increase. -What does renewable mean? -How fast is the renewable cycle for each resource? -How is man's standard of living influencing the increased needs for renewable resources? -How does increased demand for food and fiber affect the soil? -How does increased need for electrical equipment affect the water supply and water quality (thermal pollution-see glossary)? -How has increased need for transportation and more efficient use of time affect air quality? -How has increased need for fertilizers and pesticides affect plant life? (Ec) How much choice is left for the individual to decrease consumption of good and services? Why should he? What might happen if he does not or makes unwise choices? Start a "bank account" (box or chart form) to deposit reasons for conserving and reasons for wise use of renewable resources. Have a section for withdrawal which lists the survival demands for consuming resources. Children, at a later date, can select from "deposits" or "withdrawals" to use as topics for reports, slogans, poems, art work or creative writing. Retain creative efforts for an Environmental Fair during Earth Week in April. (En)

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VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	How much choice is left for the individual to decrease consumption of good and services? Why should he? What might happen if he does not or makes unwise choices?	
	Start a "bank account" (box or chart form) to deposit reasons for conserving and reasons for wise use of renewable resources. Have a section for withdrawal which lists the survival demands for consuming resources. Children, at a later date, can select from "deposits" or "withdrawals" to use as topics for reports, slogans, poems, art work or creative writing. Retain creative efforts for an Environmental Fair during Earth Week in April. (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMIN PERFOR
Children analyze man's motives for increased needs of non-renewable resources and what effects occur as a result of the choices he makes and actions he takes upon the utilization of these resources.	Have the class list the major renewable resources (see "Handbook on California's Natural Resources pp. 45+). Point out these resources or minerals are reusable but not renewable. Cover the points that with increased knowledge of use of fire, rocks and minerals man was able to recover metals from rocks and then to put it to use. Identify the term fossil fuel-"deposits of decayed plant or animal remains which, through millions of years of heat and pressure in the earth's crust have been converted into ignitable minerals". (Ec) Under each major resource, list as many articles or equipment made from makes use of that particular resource. Follow-up exercises can include activities which answer these questions: -Do we have any or make use of any of these resources in the class? at home? -Are we using it to the fullest? -What alternate ways can we reuse the resource? -Can it be recycled yet? If not, do you have evidence that industries are working towards recycling? -What could happen if we choose not to reuse non-renewable resources? (En) Illustrate or demonstrate your reusable ideas of old products. (i.e. used brick for book ends or old pots for flower holders, etc.) (En)	Children link prod uses of non-renewa sources to their i environment. Children examine a upon their choices ing these uses. Children illustrat onstrate wiser use of materials in th room or homes.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-6

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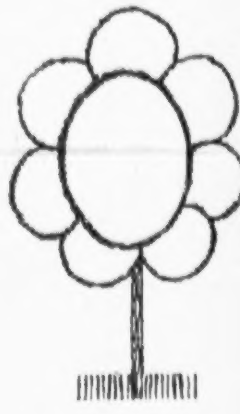
C. Men recreate the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVAL
Children begin to speculate upon the utilization of the non-exhaustible resources, such as sunlight, and to participate in challenging queries about future experiments towards its utilization.	Have children scan their neighborhoods to locate evidence that solar energy is being utilized. Look for industries which are experimenting with capturing radiant energy from the sun. Speculate on future use and possibilities for the relatively non-exhaustible resource-the sun. Hold a magnifying glass on paper as the sun penetrates its heat energy. -What kinds of work could be done using sun's direct energy (heating swimming pools, tropical fish farms, greenhouse plants, etc.)? -Can we abuse the sun's energy supply? If so, how? -Can we invent a method for using the sun's radiant energy directly? (Ec)	Child tive of th Child for d use. Child probl of th



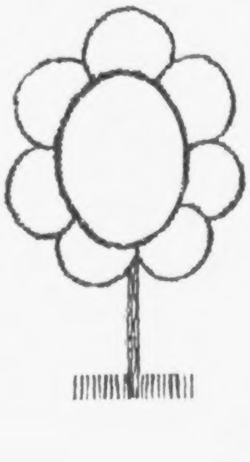
TS

A. Man is the prime agent of change of the "natural" environment.

B. Man modifies the environment in order to utilize his resources--and increase them.

C. Men recreate the environment.

CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
speculate tion of the resources, such to participate ueries about ts towards its	Have children scan their neighborhoods to locate evidence that solar energy is being utilized. Look for industries which are experimenting with capturing radiant energy from the sun. Speculate on future use and possibilities for the relatively non-exhaustible resource-the sun. Hold a magnifying glass on paper as the sun penetrates its heat energy. -What kinds of work could be done using sun's direct energy (heating swimming pools, tropical fish farms, greenhouse plants, etc.)? -Can we abuse the sun's energy supply? If so, how? -Can we invent a method for using the sun's radiant energy directly? (Ec)	Children display their inventive imaginations on the use of the sun's radiant energy. Children look for consequences for decisions made towards its use. Children conjecture future problems connected with abuse of this resource.



SUPPORTING CONCEPTS

LEVEL II-6

A. Man is the prime agent of change of the "natural" environment.

B. Man modifies the environment in order to utilize his resources--and increase them.

C. Men recreate the environment.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EV
In order to justify environmental changes, the children analyze their city or community to discover the economical reasons for its growth and development and to seek agencies in the community who play a responsible decision-making role for future development and environmental alterations.	Assign interested students for library research to locate and identify public agencies (see appendix) and organizations which are responsible for making decisions and influencing the lawmaking body which introduces bills and enacts law concerning changes in the environment (see Mylroie, California Environmental Law). -What criteria are considered when decisions are made for environmental change? -Who has the responsibility to see changes enacted? -What role do we as citizens play in order to have our voices heard? -What groups or meetings can we participate in? -Has our local neighborhood been involved in any recent decisions? Can we listen or participate in the group decision? (En)	Chi tho wit whi sio cha men

'S

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TIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
fy environ- ne children or commu- he econom- ts growth d to seek mmunity sible deci- or future vironmental	Assign interested students for library research to locate and identify public agencies (see appendix) and organizations which are responsible for making decisions and influencing the lawmaking body which introduces bills and enacts law concerning changes in the environment (see Mylroie, California Environmental Law). -What criteria are considered when decisions are made for environmental change? -Who has the responsibility to see changes enacted? -What role do we as citizens play in order to have our voices heard? -What groups or meetings can we participate in? -Has our local neighborhood been involved in any recent decisions? Can we listen or participate in the group decision? (En)	Children seek and discover those decision-making bodies within their communities which have power over decisions which will reflect a change within the environment.

SUPPORTING CONCEPTS

LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
By actively observing the school environment, children seek groups, people or policy-making bodies which determine how and how much change will occur and also to participate in one or more responsibility or duty which will affect change.	Assign volunteers to seek and locate individuals or groups who play a significant role in making decisions for environmental change within the school or classroom site. -What kinds of groups or activities does our school have in which we can voice an opinion or participate in an action related to environmental change? -What kinds of behavior do we display when we wish to make a meaningful contribution? -What kinds of issues would we raise? -What kinds of environmental change would we recommend? -What are the consequences of our choices? -Would we accept responsibility for our actions? (En)	Children seek an in or create env decision making are feasible and nature and which sponsible behavi the environment.

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
Men develop ethics for the environment. By personal behavior, children display evidences of understanding the meaning of ethics for their environment.	Discussion groups can follow any social science or humanities lessons which involve ethics, and more specifically ethics for the environment. The questions to be raised following such lessons may be: -Were the choices made morally sound? -Can we live by the decisions made? -How will these decisions affect other people? -How and will it change behavior toward the environment? -By what criteria do we judge ethics? -How are ethics transmitted, learned or developed? (En)	Children act i which reflects and attitudes t environment. Children discus the transmittal values, and att whether the pro ethically sound able.

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TS	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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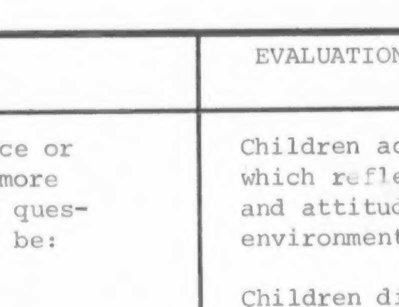

SUPPORTING CONCEPTS

LEVELS II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T
Children participate in an out-of-door experience such as a week camp program to culminate and focus their accumulated knowledge and to challenge and strengthen their value judgments about their environment.	If the schools participate in out-of-door experiences in natural environments, such as week-end or week long camps, the role of conservation can be given a great deal of stress. Experiences which will make maximum use of all their senses-smelling, tasting, touching, hearing, and seeing as well as their imaginative intuitions should be encouraged. In creating experiences for them to participate in, use many problem-solving questions and investigative and experimental strategies. Have a well planned program but be ready to be flexible and act on a moment's inspiration of a phenomenon happening which had not been planned such as an eye witness to a food chain action such as frog eating an insect or a hawk capturing a lizard. If a beer can is found behind a fallen tree, put aside the temporary lesson of an ecology of a tree and instead focus on the meaning of man's choice to leave behind an unbiodegradable object. In addition to helping children open their eyes to things they would not normally "see", do not discard any sights which the child sees, which requires investigation and which leads to generalization for further insight into man's behavior and interdependence of his environment. (Ec-En) Outdoor experiences can be conducted quite successfully on the school grounds if camps are not available. If polaroid cameras can be used or sketches made, children can be assigned in groups to record somethings they like about the environment and some they dislike. When they have their pictures, return to classroom and rank order their likes and their dislikes. Note the humanistic behavior during this activity. Two or three	Children exam systems and likes and dis their environ Children seek ledge and unde about plant a which have a their immedia Children raise questions abo and sounds no before and see explanations observed in th environments.

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S	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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SUPPORTING CONCEPTS

LEVEL II-6

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	children can remain with the teacher to help observe and later report to the group about the kinds of behavior and interaction among themselves which were displayed. -Did what we saw (smelled, etc.) appeal to all of us? -What did we like most? least? -Did everyone feel the same about what they saw? -Were you gathering sights to please the teacher, the group, or yourself? -When we disagreed what kinds of things were we saying? doing? -Does our behavior reflect society? our neighbors? -Can we agree what is best to preserve or conserve our environment? (Ec-En)	

SUPPORTING CONCEPTS

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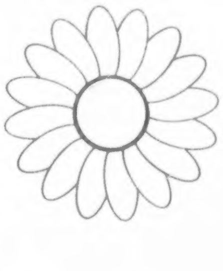
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATIO
Children participate in field trips which focus upon how man made choices to alter his environment (park vs parking lot) and to evaluate the selections based upon his value system.	Children may take culminating trips to the community or the nearby community to gather final evidences for materials which will become part of their culminating activities. Each child can focus on an area of interest whether it be economical, political or social phenomena. The will return with information which they will transpose into an art media, a science project, a play or any choice of expression which will demonstrate their understanding a part of the general concept of how man is interrelated and interdependent on his environment. -How is man conserving his environment? -How is man preventing pollution and/or annibhilation? -What future problems is he creating for himself? -What are man's responsibilities to his environment? (En)	Children c their own demonstrat environmen man is int interrelat ment as we socially i men and ma ultimately vironments



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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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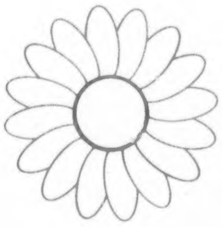

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
Children will design multiple activities which will reflect the kind of environment they choose for their future.	Challenge the children to create an environment for the future which would reflect the best of all observable and studied environments. Divide into groups and "give" each group "X" ($1,000, $10,000, etc.) number of dollars to work with to develop a small community of "X" number of people (100-5,000, etc.) in which an ideal condition existed, in terms of interdependence of the environment, which would be economically feasible, socially acceptable and could become a political reality. -Which kinds of industry or manufacturing would you need to support your city? Do they produce pollutants? How will you get rid of pollutants? -What kinds of transportation would you set up? Any pollutants involved? -What kinds sources would produce your food supply, your clothing supply and your shelter supply? -What kinds of recycling would be feasible? -What unknown problems did you come across? (En)	Children put and knowledg interdependen and determin simple worka free from th and one whic vironmental maximum leve Children adm continued en studies as t express conc ued search a making respo for environm

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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NOTES

LEVEL III - JUNIOR HIGH

COGNITIVE - AFFECTIVE SCHEME I - Societies perceive environmental issues of their time on the basis of past experience.

COGNITIVE - AFFECTIVE SCHEME II - The interaction of the culture with available technology determines the nature of the environment which is planned and developed.

COGNITIVE - AFFECTIVE SCHEME III - Social issues and decisions alter the environment.

COGNITIVE - AFFECTIVE SCHEME IV - Social issues and decisions determine the utilization of all resources.

SYMBOLS

L - Land
A - Air
W - Water
EC - Ecology, Plants and Animals
EN - Environment, Population

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

I. Societies perceive environmental issues of their time on the ba
of past experience.

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the nature of the environment which is planned and developed.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALU
Man uses skills of independence-"personal and individual inquiry". Students through reading, investigation and reporting of past history will analyze the problems affecting society's environment. (pollutions, shortages, famines)	Have students conjecture and recreate the life of an early coastal village in which the sources of food supply were dependent on hunting and gathering and the forms and division of labor identified according to male and female roles. Recall the forms of waste product its dispersions and those problems which may have caused family groups to relocate their villages. -Where did they get their drinking water? (shallow wells) -Who gathered and hunted the food supply? -What kinds of shortage problems did they face? -What happened to their waste products? (accumulated slowly and locally) -Identify the simple basic maintenance diet (berries, nuts, fish, shell food, game meat, coconuts, etc.). -How much time was left for cultural and recreational activities (crafts, communal dancing, storytelling, etc.)? -What kinds of population control existed (shortages, shell fish poisonings, fights over hunting grounds and water wells, etc.)? (En)	Studen early ships, enviro Studen of ea Studen agricu effec Studen pollut lems i of so
	Divide students into groups according to interest and dwell into the early agricultural revolution. Probe into the various parts of the world for parallel development of agriculture-Middle East (valleys of the Tigris and the Euphrates; Sinai Peninsula in the Nile Delta); Assyrian and Babylonian irrigation systems (brick lined canals);-The New World (corn from Maya civilization, "Irish potato, peanut, sweet potato, tomato, cocoa, rubber, cocaine, etc. for Central America and the Andes);-Asia (rice).	

CTIVE SCHEMES I. Societies perceive environmental issues of their time on the basis of past experience.

HIGH II. The interaction of the culture with available technology determines the nature of the environment which is planned and developed.

III. Social issues and decisions alter the environment.

IV. Social issues and decisions determine the utilization of all resources.

JECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

I. Societies perceive environmental issues of their time on the basis of past experience.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Recall origin of cultivated plants (wild roots and grains). (En-Ec) Review the early domestication of animals, and cattle especially in the Middle East. Recall how the role of religious reasons influenced their domestication. Review Man and the Environment for further elaboration. -What kinds of pollutants came about as an outfall of the agricultural evolution? -How did the early farmers combat shortages? -When famine occured, as a result of natural forces, how did it affect the people? What choices could they make? (L-En) For further research, interested students can research and review the kinds of pollutant environment which occurred as a by-product of these civilizations. Topics from Man and his Environment p. 158 1. Hunting - gathering groups 2. Early agricultural groups 3. Advanced agricultural societies 4. Industrializing societies 5. Colonial societies 6. Advanced industrial societies -How were shortages resolved? -What were actions taken during famines? -What kinds of diseases reduced population sizes? -What roles did religion and culture play in interferring with progress? With enhancing progress? (i.e. worship of cattle in India) -What were the attitudes toward natural resources?	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Have interested, fast students take any culture under consideration and trace the ecological development of its human society. The series or sequence of society development is referred by Boughey (1971) as ecoglogical succession based on categories to be analyzed: 1. increasing diversity (division of labor) 2. competition (increased specialization promoting redundant jobs) 3. structural complexity 4. decreasing dominance (by priests, rulers, etc.) 5. net productivity (difference between the total gross productivity of an ecosystem and the amount of energy to maintain its system) -What kinds of moral and practical implications for developing societies has each of these five categories? -How does each use or abuse the rules of the ecosystem? -Show related films on early civilization depicting the acquisition of "daily bread". -Record through art medias those activities which reflected man in action using and abusing his environment. (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
Man uses skills of interdependence-"acquisition of information pioneered by others". Students through reading investigating and reporting of past history will synthesis the problems affecting society's environmental illness.	Have students research environmental materials and then review through reports or panels the early signs of rising envrionmental problems in the development of the United States -strip mining -deforestation -exploiting animal life (bison, etc.) -exploiting farm land -depleting water supplies -When did problems begin to appear? -How concerned were the inhabitants? -How did they show their lack of concern? (En) Have students prepare a chart which will list some significant problems related to environmental development. List some attempts made towards their solutions. Synthesize the problems and explore the relationships to increased population growth and population needs. -As water shortages occurred how did irrigation systems develop? How did population increase as a result? -As causes of diseases (cholera, typoid, etc.) due to contaminated water were eliminated what happened to the population growth? -As agricultural techniques were improved and increased food supply accumulated, how did it affect population growth? -How did the problems reflect the choices and decisions made by the society? -How effective were the solutions that were applied? -What values were reflected in their decision-making? (En-Pop-W)	Students synthesi and recorded evid early beginnings related to the en Students indicat and results of en exploitation. Students experime tivities represen concept of increa pressure on reso fined area. Students note th some pollution o illness as a natu a part of the li Student descrimi "pollution" press "pollution" neces

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TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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Have students prepare a chart which will list some significant problems related to environmental development. List some attempts made towards their solutions. Synthesize the problems and explore the relationships to increased population growth and population needs. -As water shortages occurred how did irrigation systems develop? How did population increase as a result? -As causes of diseases (cholera, typoid, etc.) due to contaminated water were eliminated what happened to the population growth? -As agricultural techniques were improved and increased food supply accumulated, how did it affect population growth? -How did the problems reflect the choices and decisions made by the society? -How effective were the solutions that were applied? -What values were reflected in their decision-making? (En-Pop-W)	Students note the necessity of some pollution on environmental illness as a natural phenomenon, a part of the life cycle. Student descriminate between "pollution" pressures and "pollution" necessities.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	Retrace the progress of civilization and the birth of the technological age. Note the progress through the utilization of metals, fossil fuels and the advance of automation. Recall the use of stones and bones and then the metals, copper, bronze and iron and finally the "alloys". Recall how each step interrelated with the environmental resources. (En)	
	Review the historical industrial revolution and its role in creating environmental illnesses. Role-play industrialist skilled labor versus manual labor. (En)	
	Review the increased agricultural productions which shifted the population from rural to urban areas. Enact scenes of families moving from farm to city and discuss reasons - (economy, social habits, cultural adaptations). -What kinds of pollutants, which built up progressively, were prevalant in the air, on the land, in water and upon fauna and flora as rural life became urban life? (En)	
	Have students recall that although undernourishment and famine have been reduced in advanced industrial nations, most of the world lives with these problems in their advanced agricultural societies (Boughey, 1971). -How have wholesale pesticidal use affected these societies? -How have the gross waste products introduced into the biosphere by the advance industrial nations affected the other societies?	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	-What responsibilities do we have for their welfare? (En) Have students create a product (pom-poms, autograph books, a clay figure or any suggestions from them) which can be produced both by individuals or through division of labor. Have part of the students produce the entire product while other set up an assembly line. "Sell", the product and note the time-cost/benefit. Reinvest "the money" sold and note the rise of "haves" group and the "have-nots". Theoretically apply the idea to other areas of production and predict the consequences of the result of industrialization as opposed to individual labor. (En-Pop) Introduce science experiments in the class which quickly and clearly allow observation of increased population size and pressures on the resources (raising guppies in a limited area, fruitflies, seeds in a crowded garden area, etc.). -What are the first signs of pressure on the resources? -What are some pollutant signs? -What kinds of waste products are observable? -What observable signs of distress are evident? (En-Pop)	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T P
Technological development catalyzed problems for the environment. Through the skills of independence and interdependence students will analyze and synthesize the problems affecting present day society as a result of technology.	The advances in technology are created by man as he seeks to gratify needs and wants. And as the population rate grows and the consumption per capita rate grows he seeks to increase his energy supply and power. As a result, the progresses and the operations of technology produce unwanted by-products termed "pollutants". These pollutants affect, exploit or contaminate land, air, water, plant and animal life. It is only when the natural cycles in life cannot handle or disperse these pollutants that we have the beginning of environmental illnesses. Have students team in pairs or groups to become reporters who will search for technological advances in our local and neighboring communities. Use polaroid cameras, tapes, drawings or whatever means to bring the neighborhood to the class. -What kinds of energies are being harnessed? -What kinds of industries are present? -What kinds of products or services are they producing or performing? -How is our lives better because of these products or services? -What kinds of problems are they creating for either daily or long range living? -Do we really need these products or services? (En-Ec) Have individual students research and report on technological developments which are peculiar to city living such as waste sewage disposal systems, mass transportation, traffic controls, garbage disposal systems, construction of multiple dwellings, food processing and	Students begi of independen pendence as t seek and weig and the illne by technologi Students shar opinions as t necessity for services crea ical advancem Students anal internal syst which are pec groups of peo and increasin each others h

FFECTIVE SCHEMES

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OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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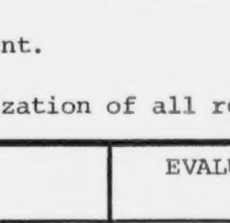
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	distribution, etc. -How does each phenomena affect the environment? -What kinds of problems arise in each? (En)	



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<tr>
<td>Students explore and investigate those activities related to environmental education in the science textbooks.</td>
<td>
Have students select one or more chapters from their science textbooks which interest them and which contributes to their store of knowledge and understanding about ecological interrelationships and interdependencies.
<table>
<tr><th></th><th>Living things are interdependent with one another and with their environment</th><th>A living things is a product of its heredity and environment</th><th>Living things are in constant change</th></tr>
<tr><td>Grade 7
The Molecule and the Biosphere</td><td>Chapters
15,16
17,18</td><td>Chapters
1, 3, 4, 5, 6, 7, 8, 11, 14</td><td>Chapter
17</td></tr>
<tr><td>Grade 8
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1, 3,
14, 15</td><td>Chapter
3</td><td>Chapters
1, 11, 12, 13, 14, 15, 17, 18</td></tr>
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Experiment with textbook investigations and report to group or class those activities found meaningful or that add to the increased awareness of ecological interrelationships.
(Ec)
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Experiment with textbook investigations and report to group or class those activities found meaningful or that add to the increased awareness of ecological interrelationships.
(Ec)</td>
<td>Students probe independently to increase their knowledge and understanding about environmental issues.
Students partake in various investigations which reflect environmental issues.</td>
</tr>
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COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TER PER
From substantiated reports, students will list and describe the pollutants to the environment.	After careful investigation of environmental conditions students tabulate as a group, their findings of pollutants. List on charts or in logs those which are prevalent in their immediate environment and those which are affecting different locales across the nation. -What kinds of pollutants affect our waters? (thermal pollution, washed away fertilizers, pesticides, algae growth due to phosphates and nitrates, etc.) -What kinds of pollutants affect our soil? (pesticides, waste disposal, deforestation, strip mining, erosion, etc.) -What kinds of pollutants affect our air? (noise, chemical gases, etc.) -What kinds of pollutants affect our plant and animal lives? (chlorinated hydrogens, pesticides, noise, etc.) -How is our population pressure on natural resources acting as a polluter? -How do we as individuals increase the pressure by our demands on goods and services? (En)	Students show a concern for the kinds of pollu the effects the air, water, pla life. Students sense population pres resources and o per capita of g services.

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Students analyze our present environmental conditions and determine how the society, community and the schools are adapting to the growth of technology.	Because the last 50-100 years saw a huge general movement of the population in the United States from the rural farm to the urban city. The life styles of the people underwent a great metamorphisis. Where once the individual was a jack-of-all-trades, he now becomes specialized. Jobs are created which never existed before and new tasks require re-training for new skills. Peace and tranquility of rural living is handed over for crowding, noise and speed of mobility. Have students discuss or debate adapting to a technological age. -How are the people adjusting or adapting to new changes of living? -What kinds of deprivation are they facing? -What kinds of enhancement does city life offer? -Debate "progress versus peace". -How have the increased demands on speed and economy of the population further increased the need for more and newer technological advances? -How many of us demand colored T.V., dryers, electrical gimmick appliances? What is the price we pay for these gadgets? (En-Pop) List the essential and non-essential kinds of powered gadgets in our home? -Are we willing to give any of these up for the sake of reducing power energy? Refer to the list of industries and commerce which are a result of technological advances. -Are we willing to reduce our demands on or give up their services entirely? As our society becomes even more complex, list the kinds of technological advance which will be needed. -Will we pay the price of power pollution, noise	Students ana and conditi ronment whic adapted to a part of surv Students rep adaptation o non-essentia services whi environmenta Students con and rural li the prices o values one e the new life living in a

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	pollution, etc., for them? -What are some noise polluters now? -How have we adapted to them? Start a collection of pictures or articles which reflect the ways man is adapting to city life compared to rural living. (En) Students examine the community's adaptation the environment by focusing on one particular facit unique to group living. Below is a partial list for areas of investigation. -Treatment of raw and drain sewage (primary, secondary, tertiary.) -Internal combustion of machines (cars, trucks and other modes of transportation) and its result of smog. -Communication facilities (radio, T.V. news media, etc.). -Land waste disposal methods (city dumps, burning facilities, etc.). -Highway construction and blacktop surfacing. -Biological magnification (pesticides: herbicide, insecticide, fungicide buildup). -Eutrophication of lakes and streams due to detergents (excess growth of water-plant life due to increased nutrients from detergents and fertilizers washed from the soil). (En-Ec)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PER
Social decisions alter the environment. Students begin to probe for reasons for social issues and decisions about their environment through continued research, reviewing tapes, films, drawings and pictures and to question the motives for people's choices which alter the environment.	Students give reports on individual observations of how people's choices altered their environment. City Life -Why did some people have gardens on window ledges or fire escapes and others did not? -Why do some people use public transportation and other drive their own car? -Why do some people hang out clothes to dry and others use dryers? Is it only economics? -Where do people go for recreation? -How important is the time factor? Have students question the choices people make similarly on suburb living and rural living. Keep in mind that the choice a person makes in his daily living alters his environment to a degree. Groups of people making choices increase the alterations as the rate of population increases. -How did we decide upon our wants and needs? -Did we have choices to make among alternatives? -Have we stopped to think about the consequences? -How are we conditioned toward choices? (En)	Students analyz people make and environment is a result of their Students questio for decision-mak apply to environ ditions.

CTIVE SCHEMES

IIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMA
Students begin to initiate plans for solutions for environmental illnesses.	After the students have discovered the sources and causes of observable and documented environmental illnesses, they can begin to speculate on the solutions to the problems through a number of different kinds of activities such as -debates -panel discussions -recreating environmental landscapes -simulated town meetings -collection drives -contests for slogans, posters, or essays, stressing awareness of problems -cleanup campaigns -any feasible activities suggested by students. (En) Apply three tests to each solution suggested: -Is it economically feasible? Can we afford to do it? -Is it politically a reality? Can such actions be made legal? -Is it socially acceptable? Can we live with the solution; would we really abide by our decisions? (En)	Students take actio solutions to environ problems within thei bilities. Students show awaren reality in making de by which they must l

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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COGNITIVE-AFFECTIVE SCHEMES

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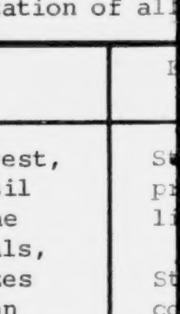
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	I
Environment is enhanced through conservation actions. Through committee and group reports students will initiate plans for conservation of the unpolluted environment.	Students identify and list renewable resources (forest, soil, water, etc.) and nonrenewable resources (fossil fuels-coal, oil, gas; metals, etc.). They determine the various uses for each. Have students make murals, collages or any art media to display how man utilizes these resources. Identify those resources which can be conserved by reuse or recycling. Have students explore and suggest methods and activities for conservation of environment which has not been polluted. -How can we conserve energy in our classroom, schools, homes, or community? -What kinds of eco-tips will help reduction of waste on our resources? (I-Ec)	S pr li St co sc li St va pr an su a



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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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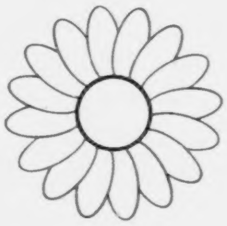

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TE PE
Students list and inquire into values of communities by reflecting upon their social decisions.	Students review films, mass media, and news media on community behavior towards their environment and generalize about group behavior in social decisions. -What kinds of construction or building are permitted in some locations and not in others? -What does zoning mean? -Why do chamber of commerce encourage influx of visitors? -Where do builders locate schools, churches, shopping centers and parks? -What does a multitude of industrial plants tell about the values of a community? -How are people's values on recreation, culture, education, commerce and leisure living reflected by a community? -In what ways do people show care and concern about their environment? -In what ways do people show lack of concern? (En) Have students categorize the value structure of a community using Laswell's eight value categories: wealth, affection, skill, power, well-being, respect, enlightment and responsibility. Note each of the various kinds of building structures (banks, libraries, service stations, etc.) within an identified area and check appropriate box in one of the categories. (En) Research recorded activities in the newspapers and note the frequency and variety of activities in which the community partakes. Tabulate. Summarize a value profile. -Does one category have more checks than another?	Students displ community's va past decisions in constructin their city. Students contr communities' a describe the v of the communi

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	-Are some activities not recorded about which we know and can be included in our tabulations? -What does a profile tell us? (En)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Political decisions alter environment. Through continued investigation and reporting students uncover and identify laws and rules which deterine the utilization of environment.	Students can review how bills are introduced, in California in the Legislature, how numbers are assigned to each bill (Assembly Bill- A.S. 201 and Senate Bill- S.B. 17) and how bills become statutes if it passes both houses of the Legislature and signed by the Governor. Recall how laws become chapters of statutes of that year and each is assigned a number (chap. 37, Stats 1971). Interested students can further probe into West's California Legislative Service and the Legislative Counsel's Summary Digest of Statutes Enacted and Resolutions Adopted. -What kinds of laws are being enacted by our Legislature? -How much of the individual's freedom can be legislated? -Who makes the bills? -How do we go about initiating environmental bills for action? -Who are our congressmen (see appendix)? -How do we write to them (see appendix)? (En-Pop)	Students a legislativ cerning en Students g perience i islation i Students a in promot mental ide letters t the state
	Students can persue guide books on environmental law such as Mylroie's California Environmental Law, a Guide to learn the kinds of laws related to environmental quality, generally, and then for areas of specific interest such as pesticides, air and water quality, land use and waste management or other areas of interest. The guide includes lists of public and private organizations who are concerned with environmental problems. There are other good resource books such as The California Handbook and The California Roster issued annually by the Secretary of State in Sacramento. (En)	

FECTIVE SCHEMES	I. Societies perceive environmental issues of their time on the basis of past experience.
. HIGH	II. The interaction of the culture with available technology determines the nature of the environment which is planned and developed.
	III. Social issues and decisions alter the environment.
	IV. Social issues and decisions determine the utilization of all resources.

BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
cisions alter inued investigation g students uncover laws and rules ne the utilization nt.	Students can review how bills are introduced, in California in the Legislature, how numbers are assigned to each bill (Assembly Bill- A.S. 201 and Senate Bill- S.B. 17) and how bills become statutes if it passes both houses of the Legislature and signed by the Governor. Recall how laws become chapters of statutes of that year and each is assigned a number (chap. 37, Stats 1971). Interested students can further probe into West's California Legislative Service and the Legislative Counsel's Summary Digest of Statutes Enacted and Resolutions Adopted. -What kinds of laws are being enacted by our Legislature? -How much of the individual's freedom can be legislated? -Who makes the bills? -How do we go about initiating environmental bills for action? -Who are our congressmen (see appendix)? -How do we write to them (see appendix)? (En-Pop) Students can persue guide books on environmental law such as Mylroie's California Environmental Law, a Guide to learn the kinds of laws related to environmental quality, generally, and then for areas of specific interest such as pesticides, air and water quality, land use and waste management or other areas of interest. The guide includes lists of public and private organizations who are concerned with environmental problems. There are other good resource books such as The California Handbook and The California Roster issued annually by the Secretary of State in Sacramento. (En)	Students attain experience in legislative procedures concerning environmental bills. Students gain measurable experience in simulating legislation in action. Students actively participate in promoting their environmental ideas by writing letters to the officials of the state or nation.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

I. Societies perceive environmental issues of their time on the basis of past experience.

II. The interaction of the culture with available technology determines the nature of the environment which is planned and developed.

III. Social issues and decisions alter the environment.

IV. Social issues and decisions determine the utilization of all resources.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	The National Wildlife issues Conservation Report, a mimeographed summary of all conservation legislation introduced or being considered in the Congress of the United States. -Can we legislate environmental action? -Who consents to legislation? -What kinds of environmental legislation do we want? -Will we have to enact laws to maintain pure air or water quality? -Will we need resource utilization controls? -Will we need Environmental Bill of Rights and Responsibilities? -How shall we solve our economic environmental problems by law? -What kinds of social laws can we pass to change behavior towards conservation? -Are we willing to legislate the number if any, of children each family may have? -If there is a shortage in our food supplies would we be willing to legislate the right to keep pets who consume foods essential to our survival? -What other "rights" might we legislate in order to benefit the total population? (En) Students can initiate letters of concern and write to congressmen in their area. The local Registrar's offices will provide the names of their congressmen and representatives. (See Appendix) Be knowledgeable and be sure you have gathered data about your concerns. Request specific action on a specific problem or encourage the passing or voiding of specific	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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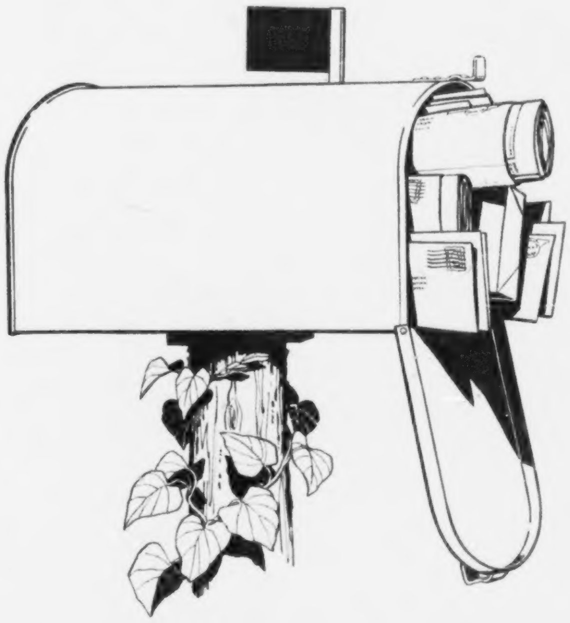
PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	bills. Make your letters brief, to the point and be polite. Note also agencies and interested groups (see appendix) who can add strength to the students proposals. (En) The class can simulate a legislative body in action enacting a specific bill the class has chosen. Have some students note the strengths and weaknesses of the actions taken and report to the group on their findings. (En)	



COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMIN PERFO
Based on previous knowledge, students will analyze who makes the decisions concerning the utilization of natural, physical and human resources.	Students probe into their own family experiences to understand why choices are made. -What are the kinds of material things we accumulate in our homes? -What economic factors helped make our decisions to accumulate and possess? -What kinds of services other than manual labor do we have in our homes (vacuum cleaner, garbage disposal, electric garage door, etc.)? -What values do we attach to each? -What are the kinds of sources of income does our families have? -Who decides how much and on what, money is to be spent? -Who is responsible for actions taken? (En)	Students increase investigative skil abilities. Students develop c understandings of who makes decision family and communi to environment.
	Students probe into the community experiences to understand why choices are made? -Where does the community get its money for parks, roads, services such as police department, fire department and libraries? -What bodies or agencies, such as City planning commissions, parks and recreational departments, board of supervisors, or committees on conservation does our community have? (See Appendix) -Who decides how monies will be spent and on what projects? -What kind of voice do the people have in the choices made? -Are we making use of this choice? -What kinds of power or voice in decision making do we have that we were not aware of? -To whom can we voice our complaints or dissatisfaction? (En)	

ECTIVE SCHEMES I. Societies perceive environmental issues of their time on the basis of past experience.

HIGH II. The interaction of the culture with available technology determines the nature of the environment which is planned and developed.

III. Social issues and decisions alter the environment.

IV. Social issues and decisions determine the utilization of all resources.

BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	Students probe into the community experiences to understand why choices are made? -Where does the community get its money for parks, roads, services such as police department, fire department and libraries? -What bodies or agencies, such as City planning commissions, parks and recreational departments, board of supervisors, or committees on conservation does our community have? (See Appendix) -Who decides how monies will be spent and on what projects? -What kind of voice do the people have in the choices made? -Are we making use of this choice? -What kinds of power or voice in decision making do we have that we were not aware of? -To whom can we voice our complaints or dissatisfaction? (En)	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVAL
Value systems determine career decisions. Students will participate in clarifying responses and discussions about choices they will make in their career decisions and how these decisions will alter the environment.	The students can hold clarifying discussions about career decisions they will consider and how those careers interrelate and become interdependent with their environment. -What kinds of choices do we have for choosing careers? -In what ways will these careers influence environmental alterations? -Can we create new positions in conservation or in battling pollutant areas? -What will the consequences be for ourselves and for the environment if we choose to embark on one or more of these careers? -What rewards will there be for us? -What responsibilities will we have to assume along with it? -Will it be worth it? -Can we live with our decisions? -Will we be prepared to adapt and change as the environmental conditions demand it of us? -What kinds of action can we take now to begin our early training and experiences? (En)	Stude emplo lated actio Stude plann their be in envir Stude invol which indir

SCHEMES

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VES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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COGNITIVE-AFFECTIVE SCHEMES

LEVEL III-JR. HIGH

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of past experience.

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the nature of the environment which is planned and develop

III. Social issues and decisions alter the environment.

IV. Social issues and decisions determine the utilization of a

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES
Students will develop the idea that man cannot continue to deal with his world as he has in the past and will project answers for solutions for change in action or behavior.	Students can set up forums or panel groups to discuss and/or simulate ideas which deal with changes for future living. They can raise many questions which deal with changes in behavior and attitudes. Students can create skits which look back from the year 2000 and focus on the decisions for survival or the decisions for destruction which man made. (En) Students can project activities on other planetary spheres beyond mother Earth and predict the kind of world and involvement that may be possible as a result of actions taken now. (En-Ec) Interested students can study interplanetary transportation and conjecture the total ecosystem necessary to maintain survival in the space vehicle as well as on the new terrain encountered. (En) Imaginative and creative students may write fiction, songs other language vehicles by which the ideas of ecology or environmental dependency is the central focus. (Ec-En)

E-AFFECTIVE SCHEMES

I-JR. HIGH

I. Societies perceive environmental issues of their time on the basis of past experience.

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NCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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LEVEL IV - SENIOR HIGH

COGNITIVE-AFFECTIVE SCHEME I - In any given environment, organisms are linked within an ecosystem.

COGNITIVE-AFFECTIVE SCHEME II - Issues and decisions affecting the world ecosystem reflect the pressure of population upon resources.

COGNITIVE-AFFECTIVE SCHEME III- Wise utilization of the environment is dependent on the organization of shortage.

COGNITIVE-AFFECTIVE SCHEME IV - The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

SYMBOLS

L - Land
A - Air
W - Water
EC - Ecology, Plants and Animals
EN - Environment, Population

COGNITIVE-AFFECTIVE SCHEMES
LEVEL IV-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.

II. Issues and decisions affecting the world ecosystem reflect the pressure of population upon resources.

III. Wise utilization of the environment is dependent on the organization of shortage.

IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-T PE
Understanding of ecosystems. Students through scientific and investigative procedures will develop the ability to grasp the principles and generalizations of the ecosystems in the study of ecology.	Students study the relationships of the terms involved in understanding the balances of the ecosystem. They discover that two basic elements make up the ecosystems, whether planetary size or a small water puddle. They are biotic community - man, plants and microbes composing the biosphere and the abiotic community - the atomsphere with gasses, vapors, particles of the air together with geo-chemi-physical features of land and sea composing the ecosphere. (Ec) If not already presented these concepts in earlier grades, the students can set up mock-up models to visualize the relationships. Review the water cycle. Review the carbon cycle. Review the nitrogen cycle. See science textbooks for detailed diagrams and directions. (Ec) Students review and recall vocabulary related to ecosystems and to interrelationships between man and his environment. (See glossary) (Ec)	Students becom intricate bal tionships of by recalling ties about th water, nitrog Students ident the terminolo used in conne ances and imb ecosystems.

IVE-AFFECTIVE SCHEMES

V-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.

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III. Wise utilization of the environment is dependent on the organization of shortage.

IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

IANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.

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IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINA PERFORMA
Students analyze the radiant solar cycle and how energy is transferred to man through charting and diagramming meaningful relationships.	Have students review and recall that the ecosystems also contain a radiant solar cycle through which energy is transferred from sunlight throughout the ecosystem and recycled again. Set up charts to show flow: producers: green plants (photosynthesis) consumers: herbivores (plant eaters) carnivores (animal eaters) omnivores (plant and animal eaters) decomposers:saprobes -How do green plants capture solar energy? -What is autrophic organism? hetertrophic? (see glossary) -How is biomass recycled? -How is energy lost during transfer between the various trophic levels? -What is the Eltonian pyramid (See Boughey, p. 10-11-loss of energy through successive trophic levels-producer-primary, secondary, tertiary consumers) (Ec) Students define productivity as related to the energetics of an ecosystem, that is how much is produced or yielded in calories in a given area in a given time by a producer (green plant). This is also known as gross productivity. To be taken into consideration is the loss of producer respiration, thereby creating net productivity. This concept is basic to the understanding of how the total biotic population is limited by the finite photosynthetic activitities of producers and the understanding of food supply shortages. -Draw diagrams to illustrate various productivity rates or yields with different crops. Illustrate	Students display dia charts which illustr meaningful relation tween radiant solar and its transfer to

TIVE SCHEMES

H

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CTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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COGNITIVE-AFFECTIVE SCHEMES
LEVEL IV-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.
II. Issues and decisions affecting the world ecosystem reflect the pressure of population upon resources.
III. Wise utilization of the environment is dependent on the organization of shortage.
IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	how many trophic levels (levels of consumers) the yield goes through before it reaches man's table. Illustrate the varieties of yield of crop which is grown for primary consumers (cattle, sheep, hogs, etc.) which is not generally eaten by man and those varieties of crop which man eats directly as primary consumer (corn, wheat, radishes, etc.). (Ec)	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATIO
Through observation of environmental examples or by viewing motion picutres and charts, students contrast and compare various communities and locales in stages of ecological succession.	Have the students recall that the identity of a specific population of an ecosystem is called a community. Further, have them recall that there is an ecological succession in which species become diversified for a variety of reasons and that they adapt and evolve until, from a pioneer community, a climax community is reached. This concept is difficult to observe happening but if fields and woods are within the students observations they can take a field trip to compare and contrast coniferous trees, deciduous trees and sagebrush. They can view suburb farms and fields from still pictures or charts. View local districts films which depict illustrations of communities in various levels of succession including those which show how a farm community became a city. Successions or developments can be illustrated by murals, cartoons or other art media. -What examples of a pioneer community can you find? -What examples of a climax community can you observe? -In what ways has man hastened ecological succession? -How is man destroying himself through his speed for change? -Why are we in such a hurry for change? What is there to gain? to lose? (Ec-En-L-A-W)	Students o various sta succession Students qu speed by wh changes in

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	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
ron- ng re ales -	Have the students recall that the identity of a specific population of an ecosystem is called a community. Further, have them recall that there is an ecological succession in which species become diversified for a variety of reasons and that they adapt and evolve until, from a pioneer community, a climax community is reached. This concept is difficult to observe happening but if fields and woods are within the students observations they can take a field trip to compare and contrast coniferous trees, deciduous trees and sagebrush. They can view suburb farms and fields from still pictures or charts. View local districts films which depict illustrations of communities in various levels of succession including those which show how a farm community became a city. Successions of developments can be illustrated by murals, cartoons or other art media. -What examples of a pioneer community can you find? -What examples of a climax community can you observe? -In what ways has man hastened ecological succession? -How is man destroying himself through his speed for change? -Why are we in such a hurry for change? What is there to gain? to lose? (Ec-En-L-A-W)	Students observe and analyze various stages of ecological succession. Students question the rate or speed by which man proposes changes in the successions.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Students investigate studies in which the food web and various food chains are isolated for purposes of analysis and probes.	Students review earlier studies of food webs or a series of food chains and recall the consumer - consumed relationships - at various successive trophic levels. Synthetic simulated ecosystems can be created to be observed under experimental conditions (Boughey, 1970). 1. Grow and maintain alga (chlorella) in a nonsustaining ecosystem to determine what one or more abiotic factors (temperature, nutrient level, energy output) have on population size. (See Boughey, p. 12). 2. Grow and maintain alga in a self-sustaining experimental ecosystem, and introduce the heterotrophs Dapnia and Hydra, a primary and a secondary consumers, to study "the effect of varying the population density of the producer organism and the effect of varying the rate of predation by a tertiary consumer. (pp. 13, 14) Note diagrams. (Ec)	Students review and recall earlier studies of the operation and the interrelationships of food webs. Students illustrate schematically illustrations of the phenomena.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
To increase their understanding of how the decomposers (saprobes) of the food chain function and how man is interferring with their role, students probe their research books and investigate their communities.	Students may need further understandings of the work the decomposers of saprobes do. See laboratory experiments in science textbooks to develop the concepts. Here the students need to embrace the concept of how difficult it is for the microbial population of the decomposers to handle the uncontrollable and insurmountable waste being accumulated by the human population. Even more of a problem is the accumulation of difficult synthetic substances or non-biodegradable materials which decomposer organisms are unable to break down and to recirculate their nutrients back into the ecosystems. (Ec) Students can investigate their own local and neighboring communities to learn how waste disposal both on land and in water is handled. -What kinds of disposal are in operation? -What price does the community or the environment pay for the water or land which is used? -What health problems arise? -How are biodegradable materials disposed of (burial, burning, etc.)? -What affect aesthetically has the disposal sites on the environment? -What kinds of choices do we have on locating land disposal sites, water disposal sites? (L-W-En) Another increasingly alarming problem for waste disposal occurs with the use of pesticides. Toxic substances are introduced in new products or are sprayed on plants and animals which tend to concentrate as it accumulates and tends to destroy tolerance levels of either decomposers	Students di biodegrada gradable w Students di kinds of w which incl stances at able to tr decomposer reducing t tion of th food chain Students s see how th other comm increased

E-AFFECTIVE SCHEMES
-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.

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IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

NCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
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	Students can investigate their own local and neighboring communities to learn how waste disposal both on land and in water is handled. -What kinds of disposal are in operation? -What price does the community or the environment pay for the water or land which is used? -What health problems arise? -How are biodegradable materials disposed of (burial, burning, etc.)? -What affect aesthetically has the disposal sites on the environment? -What kinds of choices do we have on locating land disposal sites, water disposal sites? (L-W-En)	Students seek information to see how their community and other communities handle increased waste disposal.
	Another increasingly alarming problem for waste disposal occurs with the use of pesticides. Toxic substances are introduced in new products or are sprayed on plants and animals which tend to concentrate as it accumulates and tends to destroy tolerance levels of either decomposers	

COGNITIVE-AFFECTIVE SCHEMES

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IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	or the consumers of the life cycles. (See appendix for list of harmful pesticides and toxic residuals.) Have students investigate their environment to locate and identify sources of contamination. List and classify known sources and research those which are readily available on our open markets. See films introducing new products and those which show disposal of old or used products. -What evidence of uses of pesticides can you observe in your environment? -What recent news from the mass media is available to further substantiate the fact that synthetic and poisonous substances are being introduced into our ecosystems? -List as many samples from your immediate and home environment that illustrate toxic pollutants to the environment. -What action can we take to change non-degradable substances to degradable? -What articles or products would we give up to reduce the toxic accumulated waste materials? -What is our community doing about this particular problem? -Where can interested persons go for additional information? (See appendix) -What kinds of recycling programs are available? Could be made available? -Who pays for the process of changes? (L)	

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERM PERF
To internalize the meaning of biological magnification, students probe sources which describe or give evidence of its destructive actions. They learn the meaning of pesticides (herbicides, insecticides, fungicides, etc.) and what effects they have on the total environment.	Have students probe into the principles of biological magnification. As pesticides are more widely used, animals,fish and birds tend to concentrate the poisons within their body. As the predator in the higher trophic level consumes them as food, the toxic substances increase in concentration until permanent damage or extinction is caused in the higher level consumer. Some students may wish to investigate the nature of certain pesticides and their influences along the food chain. -What are some known effects of pesticides on animals in general? -Which kinds of wildlife might be most susceptable to the ill effects of biological magnification? -How do we combat this problem? -What role do we play in increasing pesticidal use? -What kinds of pesticides (herbicide, fungicide, insecticide) are most harmful? (Ec) Have interested students study in depth the various kinds of pesticides - insecticide (animal life), herbicide (green plant life), fungicide (fungus plants), etc. List and categorize the various poisons under each. (See appendix). -What is the purpose of each kind of pesticide? -What are its primary benefits? long-range benefits? -What are the side effects to animals? to humans? -What are chlorinated, hydrocarbons, organophosphates, and carbanates? (See appendix). -How are poisons misused? -What effects do they have on land, on water or to our air? (Ec-L-A-W)	Students display which they have which reflect th of biological ma Students list an several kinds of and note the eff on animal life, and man.

E-AFFECTIVE SCHEMES

-SR. HIGH

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NCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
alize the meaning of l magnification, stu- be sources which de- give evidence of its ve actions. They meaning of pesticides es, insecticides, s, etc.) and what hey have on the total nt.	Have students probe into the principles of biological magnification. As pesticides are more widely used, animals, fish and birds tend to concentrate the poisons within their body. As the predator in the higher trophic level consumes them as food, the toxic substances increase in concentration until permanent damage or extinction is caused in the higher level consumer. Some students may wish to investigate the nature of certain pesticides and their influences along the food chain. -What are some known effects of pesticides on animals in general? -Which kinds of wildlife might be most susceptable to the ill effects of biological magnification? -How do we combat this problem? -What role do we play in increasing pesticidal use? -What kinds of pesticides (herbicide, fungicide, insecticide) are most harmful? (Ec) Have interested students study in depth the various kinds of pesticides - insecticide (animal life), herbicide (green plant life), fungicide (fungus plants), etc. List and categorize the various poisons under each. (See appendix). -What is the purpose of each kind of pesticide? -What are its primary benefits? long-range benefits? -What are the side effects to animals? to humans? -What are chlorinated, hydrocarbons, organophosphates, and carbanates? (See appendix). -How are poisons misused? -What effects do they have on land, on water or to our air? (Ec-L-A-W)	Students display evidence which they have gathered which reflect the ill effects of biological magnification. Students list and categorize several kinds of pesticides and note the effects, if any, on animal life, plant life and man.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION
The students will probe into the principles of eutrophication to learn how man is playing a role in providing increased nutrients to our waterways and ultimately to limit production of oxygen supply by his actions of fertilization of fields and using certain detergents in laundry.	Have students probe into the basic principles of eutrophication (see glossary). Discuss how certain fertilizers with nitrogen used for agricultural purposes which are washed away from the soil and are carried in our waterways and how certain detergents using phosphates as a cleanser agent which are washed away into our sewage disposal which drain into our waterways contribute to the increased nutrient supply for algae and other plant life growth. -What does increased plant life do to the oxygen content in water? -What effect does the growth of algae on the water surfaces have on plant life below? (Screening prohibits sunlight energy and therefore limits photosynthesis). -What happens to the need for oxygen supply for microorganisms aquatic life or phytoplankton? -What does it mean for a river or stream to be "choked-up" or over-supplied with nutrients? -What has industry done to combat eutrophication? -Have synthetic substances for phosphates been beneficial or harmful? -What choices do we have in buying soaps or detergents? -Are we willing to risk "gray" -er washes for reducing eutrophication? -How can we request helpful action from manufacturers of phosphates, nitrates or other substances not harmful of itself but detrimental when misused? (Ec-En)	Students de record prin eutrophicat Students se man plays the normal duction of nitrogen an our waterwa

ECTIVE SCHEMES

HIGH

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
will probe into s of eutrophica- n how man is play- n providing in- ents to our d ultimately to tion of oxygen s actions of n of fields and n detergents in	Have students probe into the basic principles of eutrophication (see glossary). Discuss how certain fertilizers with nitrogen used for agricultural purposes which are washed away from the soil and are carried in our waterways and how certain detergents using phosphates as a cleanser agent which are washed away into our sewage disposal which drain into our waterways contribute to the increased nutrient supply for algae and other plant life growth. -What does increased plant life do to the oxygen content in water? -What effect does the growth of algae on the water surfaces have on plant life below? (Screening prohibits sunlight energy and therefore limits photosynthesis). -What happens to the need for oxygen supply for microorganisms aquatic life or phytoplankton? -What does it mean for a river or stream to be "choked-up" or over-supplied with nutrients? -What has industry done to combat eutrophication? -Have synthetic substances for phosphates been beneficial or harmful? -What choices do we have in buying soaps or detergents? -Are we willing to risk "gray" -er washes for reducing eutrophication? -How can we request helpful action from manufacturers of phosphates, nitrates or other substances not harmful of itself but detrimental when misused? (Ec-En)	Students develop, discuss and record principles of eutrophication. Students seek examples of how man plays a role in speeding the normal process by introduction of products such as nitrogen and phosphates into our waterways.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

I. In any given environment, organisms are linked within an ecosyste

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IV. The concepts and values man accepts as guides to his future behav determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUAT
Causes of imbalance to ecosystems. Students will probe into the effect of an increased population growth and its meaning for the environment.	Have students begin to probe for understanding the meaning of increased population growth, to learn how the emphasis on population growth is of very recent occurrence and that population fluctuations was of greater concern in the past because excess population could easily seek unpopulated areas to form new empires and colonies. -Why do we care how many people there are today? -What makes us concerned about the rate of increase? -What could we do with excess population in the past? -Why can't we solve our excess problems in the same way? -How is increased population becoming a pressure on our environment today? (En-Pop)	Student of incr growth. Student between todays growth. Student which o growth a press

TIVE SCHEMES

GH

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ECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
nce to eco- obe into the reased popula- its meaning ment.	Have students begin to probe for understanding the meaning of increased population growth, to learn how the emphasis on population growth is of very recent occurrence and that population fluctuations was of greater concern in the past because excess population could easily seek unpopulated areas to form new empires and colonies. -Why do we care how many people there are today? -What makes us concerned about the rate of increase? -What could we do with excess population in the past? -Why can't we solve our excess problems in the same way? -How is increased population becoming a pressure on our environment today? (En-Pop)	Students identify the problem of increased population growth. Students make comparisons between past concerns and todays problems of population growth. Students identify problems which occur as the rate of growth of population becomes a pressure.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
To gain further insight into population pressure, students will participate in such activities which will, identify how population sizes change, interpret what demographic data reveals, and determine what implication the growth have on the health and nutrition of the environment.	Have students probe into population studies (Boughey, 1970) which describe how population density, of diversification of its levels of its agriculture versus industry; of the limited carrying capacity of the ecosystem and of new frontiers which needed to be explored. Have students refer to world population charts which reveal demographic data to answer questions such as: -When did population growth become a problem? -How fast has the rate been in the past? -What is the rate now? -What is predicted for the future? -What is meant by theoretical population growth? -What is the rate of natural increase? -Have students analyze birth rate statistics and mortality rates for evident patterns which are evolving. (En-Pop) As population growth becomes apparent in a community problems arise in health and nutrition. Have students divide into committees to devise activities which would help them to a clearer understanding of how crowding, poverty, sanitation and cleanliness become social ills to be faced and overcome. Recall earlier activities in the lower grades in which population of classrooms were increased without an increase in resources. Recall animal investigations in which animals in a cage were increased while food supply was held constant. -What happens to food supply and diets as family size is increased without an increase in income? -What happens to food supply and diet as family groups increase in numbers in the city or town and	Students probe into studies on the increased rate of population to discover reasons for growth and fluctuation. Students enact activities which will help internalize the meaning of population pressures. Students seek relationships between rates of increase in population and the implications for the health and nutrition of people.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	the source and quantity of food remains constant or cannot keep up with the demand of the increased population? -What implications for nutrition has the rise of population? (En-Pop)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUA
The student will analyze the effects of urbanization and its meaning for his environment.	As the nation grew and the industrial revolution brought about diversified jobs, people located centrally in towns and cities to perform at specialized tasks. The percentage of farmers feeding the nation is becoming increasingly small. As a result people in urban areas are more and more dependent on fewer and fewer numbers of people to maintain their food supply. Have students probe into the choices people make in deciding where to live and how to find food to survive. -What happens to the source of food supply when man becomes urbanized? -What must he give up or exchange for in order to find food for himself? -How does man decide where he will live? -What happens to existing communities when groups of people infiltrate from the outside and remain to raise families? -Who encourages visitors to stay? -How does the chamber of commerce participate in promoting influx of people? -What kinds of jobs act as incentives for people to migrate from one territory to another? -What kinds of goods and services need to be expanded in order to meet the needs of people in highly specialized positions? -How is the carrying capacity (see glossary) affected of an ecosystem as the increased population creates pressures? -What happens to resources as the rate rises? -Can all be fed and housed adequately? (Ec-[illegible])	Student ships o growth urbaniz Student of how about s and the for our

FFECTIVF SCHEMES

HIGH

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OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
will analyze the rbanization and for his environ-	As the nation grew and the industrial revolution brought about diversified jobs, people located centrally in towns and cities to perform at specialized tasks. The percentage of farmers feeding the nation is becoming increasingly small. As a result people in urban areas are more and more dependent on fewer and fewer numbers of people to maintain their food supply. Have students probe into the choices people make in deciding where to live and how to find food to survive. -What happens to the source of food supply when man becomes urbanized? -What must he give up or exchange for in order to find food for himself? -How does man decide where he will live? -What happens to existing communities when groups of people infiltrate from the outside and remain to raise families? -Who encourages visitors to stay? -How does the chamber of commerce participate in promoting influx of people? -What kinds of jobs act as incentives for people to migrate from one territory to another? -What kinds of goods and services need to be expanded in order to meet the needs of people in highly specialized positions? -How is the carrying capacity (see glossary) affected of an ecosystem as the increased population creates pressures? -What happens to resources as the rate rises? -Can all be fed and housed adequately? (Ec-En)	Students examine the relationships of rise in population growth and the increase in urbanization of its people. Students search for examples of how urbanization brings about specialization of tasks and then dependency on a few for our food supplies.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Have students through discussions, panels, and individual reports relate the reasons for the continued rise of population rate. Students will inquire into reasons which limit population growth.	Students may choose their own method of expressions (art form, discussions, simulations, etc.) to illustrate the influences for population growth. -How does the improvement of technology in health such as "victory over microbes" and in nutrition such as improved agricultural techniques tend to increase population growth? -How does the new job openings in industry tend to entice immigration to certain locations? -Whose population rate is higher-developed or under-developed countries? -Why do some countries still encourage large families? -How do their values play a role in decision-making? -Some ethnic groups refuse to consider population reduction for fear of extinction or fear of loss of power. Why? (En-Pop) Have students list on the basis of past experiences th kinds of limitations to population growth. -What effect has famine on growth, birth, and death rates? -What is the effect of disease on the rate? -What is the effect of war on the rates? -What is the effect of atomic warfare or germocide on rates? -What do we know about the genocide issue? (En-Pop)	Students vi rate objecti analyze the which contri rise. Students rev to determin limited popu Students del motives of c feel a need family size

CTIVE SCHEMES

IGH

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JECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
through discus- and individual the reasons for rise of popula- udents will in- sons which limit wth.	Students may choose their own method of expressions (art form, discussions, simulations, etc.) to illustrate the influences for population growth. -How does the improvement of technology in health such as "victory over microbes" and in nutrition such as improved agricultural techniques tend to increase population growth? -How does the new job openings in industry tend to entice immigration to certain locations? -Whose population rate is higher-developed or under-developed countries? -Why do some countries still encourage large families? -How do their values play a role in decision-making? -Some ethnic groups refuse to consider population reduction for fear of extinction or fear of loss of power. Why? (En-Pop)	Students view the population rate objectively and try to analyze the many reasons which contribute towards its rise. Students review past history to determine the reasons which limited population growth. Students delve into the motives of certain groups who feel a need for increased family sizes.
	Have students list on the basis of past experiences the kinds of limitations to population growth. -What effect has famine on growth, birth, and death rates? -What is the effect of disease on the rate? -What is the effect of war on the rates? -What is the effect of atomic warfare or germocide on rates? -What do we know about the genocide issue? (En-Pop)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
Students identify, list and categorize significant renewable resources and nonrenewable resources man utilizes in his daily survival.	Have students divide into groups to brainstorm, to identify, to list and then to categorize all the known resources which man utilizes in his daily living. (See handbook on California's Natural Resources). -What are the renewable resources associated with the farm, the fishery, and the forest? -What are the renewable resources associated with soil, water, air, plant and animal life? -What are nonrenewable resources (mineral, metals, non-metals)? -How does man depend on each? -Which does he use more frequently or in greater volume than another? -What limitations does man have on how he can avail himself of all his resources? -What privileges does he have in the choices he makes? -Give illustrations or examples how man uses some of his resources. Use any artistic form for expression. (Ec)	Students recall and review those resources renewable and nonrenewable which man utilizes in his environment daily. Students illustrate or demonstrate man utilizing his resources.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	of air and its photochemical process. -What does this mean for a large city? -How is the process of natural diffusion and "cleansing" action of wind and air halted? -What problems arise as a result of pollutants in the air which are trapped and not allowed to dissipate? -What kinds of air controls do we have in emitting pollutants to the air by cars, trucks, plants, industries and home combustions? -When does smog become a problem? -How have we personally contributed to it? -What are some ways we can reduce pollutants to the air? -How much do we know about internal combustion of machines in order to improve the quality of combustion? -What kinds of controls is the government placing on activities which produce massive pollutants to the air? (Ec)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATIO
From analyzing the informational materials collected, students will develop the ability to predict the probable effects of the unlimited consumption of our resources.	Have students simulate activities in which the limited supplies of resources are exhausted or increasingly pressured. One example may be having two classes work together in one room with no increase in room supplies or equipment for a given number of days. Another way would be to tally and record supplies and facilities used in one week's period of time for one class. Cut the supplies and facilities in one half and in one third the following week. -What happened to plans as supplies diminished? -What interactions between people were observable? -What social problems arose? -What mechanical failures ensued? -What would happen if the situation continued for a longer period of time? -How long could we survive? -What other factors enter the picture as human beings are confronted with loss of resources? (En)	Students si which refle standing o effects mig sult of sho Students pr consequence they face d ages of res

CHEMES

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
nformation- ed, stu- he ability ble effects sumption of	Have students simulate activities in which the limited supplies of resources are exhausted or increasingly pressured. One example may be having two classes work together in one room with no increase in room supplies or equipment for a given number of days. Another way would be to tally and record supplies and facilities used in one week's period of time for one class. Cut the supplies and facilities in one half and in one third the following week. -What happened to plans as supplies diminished? -What interactions between people were observable? -What social problems arose? -What mechanical failures ensued? -What would happen if the situation continued for a longer period of time? -How long could we survive? -What other factors enter the picture as human beings are confronted with loss of resources? (En)	Students simulate activities which reflect their understanding of what probable effects might occur as a result of shortages. Students predict possible consequences for humans as they face depletion or shortages of resources.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	of air and its photochemical process. -What does this mean for a large city? -How is the process of natural diffusion and "cleansing" action of wind and air halted? -What problems arise as a result of pollutants in the air which are trapped and not allowed to dissipate? -What kinds of air controls do we have in emitting pollutants to the air by cars, trucks, plants, industries and home combustions? -When does smog become a problem? -How have we personally contributed to it? -What are some ways we can reduce pollutants to the air? -How much do we know about internal combustion of machines in order to improve the quality of combustion? -What kinds of controls is the government placing on activities which produce massive pollutants to the air? (Ec)	

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
From analyzing the informational materials collected, students will develop the ability to predict the probable effects of the unlimited consumption of our resources.	Have students simulate activities in which the limited supplies of resources are exhausted or increasingly pressured. One example may be having two classes work together in one room with no increase in room supplies or equipment for a given number of days. Another way would be to tally and record supplies and facilities used in one week's period of time for one class. Cut the supplies and facilities in one half and in one third the following week. -What happened to plans as supplies diminished? -What interactions between people were observable? -What social problems arose? -What mechanical failures ensued? -What would happen if the situation continued for a longer period of time? -How long could we survive? -What other factors enter the picture as human beings are confronted with loss of resources? (En)	Students simulate activities which reflect their understanding of what probable effects might occur as a result of shortages. Students predict possible consequences for humans as they face depletion or shortages of resources.

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COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATI
Non-renewable resources are limited. Students develop the ability to recognize the limits of the earth's energy through the study of the principles and generalizations of -fossil fuel -hydroelectric power -earth's mineral resources -atomic energy -solar energy -geothermal power -tidal power	Have students investigate the nature of our source of our energy system. Historically point out how primitive man captured energy in its simple stages (fire, water, wind) and increased its harness as technological advances allowed him. Probe into the nature of: fossil fuels (coal, oil, gas, etc.) hydroelectric power atomic energy solar energy geothermal power tidal power -How is each energy captured and harnessed? -What use is made of each? -What price do we pay for the power? -What side-effects or pollution problems have arisen as a result of its use? -How is the waste or by product affecting our environment? -What strain is there on our resources? -When does the source of power become exhausted? -Can underdeveloped nations take advantage of these energies? Why? Why not? -In what ways is harnessing these energies become detrimental in our daily lives? -How does population pressure affect the use of energies? -What alternatives do we have for future utilization of environmental energies? (En-Ec)	Students utilizati daily sur Students of energy potential Students to be pai ment for energies. Students for their alternati sions abo energy ut

-AFFECTIVE SCHEMES
R. HIGH

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E OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
ble resources are evelop the ability ze the limits of the ergy through the he principles and tions of uel ctric power mineral resources nergy ergy al power wer	Have students investigate the nature of our source of our energy system. Historically point out how primitive man captured energy in its simple stages (fire, water, wind) and increased its harness as technological advances allowed him. Probe into the nature of: fossil fuels (coal, oil, gas, etc.) hydroelectric power atomic energy solar energy geothermal power tidal power -How is each energy captured and harnessed? -What use is made of each? -What price do we pay for the power? -What side-effects or pollution problems have arisen as a result of its use? -How is the waste or by product affecting our environment? -What strain is there on our resources? -When does the source of power become exhausted? -Can underdeveloped nations take advantage of these energies? Why? Why not? -In what ways is harnessing these energies become detrimental in our daily lives? -How does population pressure affect the use of energies? -What alternatives do we have for future utilization of environmental energies? (En-Ec)	Students review the early utilization of energies for daily survival. Students list the newer forms of energy and the future potential sources for energies. Students recognize the price to be paid to the environment for utilizing these energies. Students accept responsibility for their choices and seek alternatives for future decisions about environmental energy utilization.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

I. In any given environment, organisms are linked within an ecosystem.

II. Issues and decisions affecting the world ecosystem reflect the pressur of population upon resources.

III. Wise utilization of the environment is dependent on the organization o shortage.

IV. The concepts and values man accepts as guides to his future behavior determines the quality of his life, if not his survival.

PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
From gathered materials, students will be able to discuss the phenomena of deprivations in the ecosystems and its meaning for continuance or destruction of all organisms.	Have students list the various deprivations to daily living as they probe into shortages and limitations of the environment and the possible future solutions for survival. As an example, the nutrition and the well-being of an individual is totally dependent on acquisition of his resources, especially food supply. Questions to be asked would be related to that problem and how food supply shortages could be overcome: -What are the traditional methods for increasing agricultural production? -How would desalinating salty water for irrigation affect production as an answer to water shortage? -What effect would hydroponics (soilless culture) have on production? -What effect would the non-traditional planktonic harvesting of the sea have? -What effect would raising fungi on petroleum or molasses or leaf harvesting (Pirie) have? Other deprivations can be analyzed and suggestions for future activities suggested. (L-A-W-Ec)	Students se of phenomena and how it m destroy orga Students exp tion of reso ed nutritio methods to i prove our fo Students dis selves other in the depri ecosystems.

ECTIVE SCHEMES

HIGH

I. In any given environment, organisms are linked within an ecosystem.

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BJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
materials, be able to dis- omena of depriva- ecosystems and or continuance n of all orga-	Have students list the various deprivations to daily living as they probe into shortages and limitations of the environment and the possible future solutions for survival. As an example, the nutrition and the well-being of an individual is totally dependent on acquisition of his resources, especially food supply. Questions to be asked would be related to that problem and how food supply shortages could be overcome: -What are the traditional methods for increasing agricultural production? -How would desalinating salty water for irrigation affect production as an answer to water shortage? -What effect would hydroponics (soilless culture) have on production? -What effect would the non-traditional planktonic harvesting of the sea have? -What effect would raising fungi on petroleum or molasses or leaf harvesting (Pirie) have? Other deprivations can be analyzed and suggestions for future activities suggested. (L-A-W-Ec)	Students seek understanding of phenomena of deprivations and how it may continue or destroy organisms. Students explore the acquisition of resources for improved nutrition by searching for methods to increase and improve our food supply. Students discover for themselves other areas to explore in the deprivations of our ecosystems.

COGNITIVE-AFFECTIVE SCHEMES

LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-
Through map and global studies, students become aware of the uneven distribution of the world's resources, of the dependence of the United States on other nations for those resources and the meaning for our technological survival.	Have students review their geography textbooks to locate the major mineral resources of the world and how it is distributed unevenly about the globe. -Where are our large deposits of coal, oil, copper, iron phosphate and zinc located? -Where are our "mineral vitamins" (molybdenum, tungsten) located? -How can we cooperate with other nations in exchange for each others' resources? -What import and export limitations do nations put upon each other which makes it difficult to exchange resources? -What kinds of technological advances require that we cooperate in our exchange for resources? -How are we exploiting other nations reservior of resources? Display global charts with identifying pins or paper to locate global resources and deposits. Superimpose a population density shading in those areas. (En-Ec)	Students inc geographica cating and resources. Students com the resource the nations Students rel the United nations to needs requi vanced indu

TIVE SCHEMES
GH

I. In any given environment, organisms are linked within an ecosystem.

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ECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
global studies, aware of the ition of the es, of the de- United States s for those he meaning for al survival.	Have students review their geography textbooks to locate the major mineral resources of the world and how it is distributed unevenly about the globe. -Where are our large deposits of coal, oil, copper, iron phosphate and zinc located? -Where are our "mineral vitamins" (molybdenum, tungsten) located? -How can we cooperate with other nations in exchange for each others' resources? -What import and export limitations do nations put upon each other which makes it difficult to exchange resources? -What kinds of technological advances require that we cooperate in our exchange for resources? -How are we exploiting other nations reservior of resources? Display global charts with identifying pins or paper to locate global resources and deposits. Superimpose a population density shading in those areas. (En-Ec)	Students increase their geographical skills in locating and identifying global resources. Students compare and contrast the resources available with the nations using them. Students relate how dependent the United States is on other nations to supply the resource needs required for our advanced industrial society.

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMAN
Values determine the acquisition of a sanative environment. Students probe into the value system of the community and determine the necessary values which promote a healthy environment and probe those questions of social issue which will determine the conditions of a sanative environment.	Have students raise questions about the kinds of choices man has and can make about his environmental conditions and about the choices he will have to make in order to survive. Note how our value structure has built in restrictions on our choices of freedom for decision-making (Boughey, 1970) in order to protect our society. For example, we must fight for survival if our country demands it of us (draft) we cannot choose to enjoy the military restricted open environment areas of the United States or we cannot have more than one spouse at a time. Society chooses to enforce restrictions for the benefit of the total society. In light of this, Boughey suggests that in order to obtain more peaceful social arrangements and a world which had some chance of survival without catastrophic ecological change....these rights....would have to be conceded: 1. The right to have as many children as we wish. 2. The right to have any children at all by mates with particular genotypes. 3. The right to keep pets which consume food which could directly or indirectly be used for human purposes while populations and individuals elsewhere are stunted from malnutrition or dying from starvation. 4. The right to externalize our labor problems by strikes which dislocate societal facilities. 5. The right to reside in any locality of our own choice in these United States. 6. The right to accumulate wealth entirely disparate with basic needs while many elsewhere still cannot satisfy these, or to transfer inherited wealth without reduction to an indefinite number of descendant generations.	Students examine the tions and restrictio has put upon itself sake of survival. Students list and di choices for environm that man is free to Students conjecture dict the kinds of so issues man will be c with in the future a sanative environme Students simulate ac which reflect their concern and make hyp political decisions future interactions societies with each their interrelations their environment.

CHEMES

I. In any given environment, organisms are linked within an ecosystem.

II. Issues and decisions affecting the world ecosystem reflect the pressure of population upon resources.

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ES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
acquisi- nvironment. he value ity and ary values thy envi- se ques- which onditions nment.	Have students raise questions about the kinds of choices man has and can make about his environmental conditions and about the choices he will have to make in order to survive. Note how our value structure has built in restrictions on our choices of freedom for decision-making (Boughey, 1970) in order to protect our society. For example, we must fight for survival if our country demands it of us (draft) we cannot choose to enjoy the military restricted open environment areas of the United States or we cannot have more than one spouse at a time. Society chooses to enforce restrictions for the benefit of the total society. In light of this, Boughey suggests that in order to obtain more peaceful social arrangements and a world which had some chance of survival without catastrophic ecological change....these rights....would have to be conceded: 1. The right to have as many children as we wish. 2. The right to have any children at all by mates with particular genotypes. 3. The right to keep pets which consume food which could directly or indirectly be used for human purposes while populations and individuals elsewhere are stunted from malnutrition or dying from starvation. 4. The right to externalize our labor problems by strikes which dislocate societal facilities. 5. The right to reside in any locality of our own choice in these United States. 6. The right to accumulate wealth entirely disparate with basic needs while many elsewhere still cannot satisfy these, or to transfer inherited wealth without reduction to an indefinite number of descendant generations.	Students examine the limitations and restrictions society has put upon itself for the sake of survival. Students list and discuss the choices for environmental use that man is free to make. Students conjecture and predict the kinds of social issues man will be confronted with in the future to maintain a sanative environment. Students simulate activities which reflect their areas of concern and make hypothetical political decisions about future interactions of human societies with each other and their interrelationships with their environment.

COGNITIVE-AFFECTIVE SCHEMES
LEVEL IV-SR. HIGH

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	7. The right to monopolize what would otherwise be community facilities. 8. The right to exploit national resources to the public detriment. 9. The right to possess lethal weapons. 10. The right to discharge wastes into the environment. Each of these topics can be taken separately for debate purposes or for furthur investigation by the students. They may form town meetings to discuss and to act on these issues for acceptance or rejection for their community of each proposal above. (En) Students can express their future concerns on additional issues which would limit or restrict the kinds of choices they were permitted. They may continue further inquiry into alternatives left for them to choose from and finally the responsibility for the consequences of their choices. (En) Students may set up Bills of Rights and Restrictions on our environment and set up methods for enforcements. They may raise questions for future concern. -Can we avoid population regulations? -Can we permit resource depletion? -Can we sanction contamination and pollution? -Will we apply artificial selection to human genotypes? -Will we allow only the immigration of innovative,	

COGNITIVE-AFFECTIVE SCHEMES

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PERFORMANCE OBJECTIVES	TEACHING-LEARNING INQUIRIES	EVALUATION-TERMINAL PERFORMANCE
	creative and inventive groups of individuals to our states to develop a "Homo Innovatus" (Boughey, 1970). (En)	

APPENDIXES

FILMS - FILMSTRIPS

NOTES

FILM AND FILMSTRIP SOURCES

AF Avis Films, Post Office Box 643, Burbank, California
91503

AFP American Film Productions, 1540 Broadway, New York,
N. Y. 10036

AIBS American Institute of Biological Science, 2000 P Street,
N. W., Washington, D. C. 20006

AIM Association of Instructional Material, 347 Madison
Avenue, New York, N. Y. 10017

ATAT American Telephone and Telegraph Company, Information
Department, 195 Broadway, New York, N. Y. 10007

CDC Communicable Disease Center, Public Health Service,
Atlanta, Georgia 30304

CENCO Cenco Educational Films, 1700 Irving Park Road, Chicago,
Illinois 60613

Ch Churchill Films, 6671 Sunset Boulevard, Los Angeles,
California 90025

Cor Coronet Films, 65 E. South Water Street, Chicago,
Illinois 60601

Curr Curriculum Films, Inc., 1319 Vine Street, Philadelphia,
Pennsylvania 19104

EBF Encyclopedia Brintannica Films, Inc., 1150 Wilmette
Avenue, Wilmette, Illinois 60091

EG Eye Gate House, 146-10 Archer Avenue, Jamaica, New York,
N. Y. 11435

FH Filmstrip House, 432 Park Avenue South, New York, N. Y.
10016

IFB International Film Bureau, 332 S. Michigan Avenue,
Chicago, Illinois 60604

IU Indiana University, Audio-Vi
Indiana 47405

Jam Jam Handy, 2821 Grand Bouleva

JF Journal Films, 909 W. Diverse
Illinois 60610

KA Kaiser Steel Corporation, 30
California 94612

Life Life Magazine, Filmstrip Divi
New York, N. Y. 10020

McG McGraw-Hill Text Films, 330
N. Y. 10018

MIS Moody Institute of Science,
Boulevard, Whittier, Cali

NFBC National Film Board of Canad
New York, N. Y. 10019

PIC Pictura Films Corporation,
New York, N. Y. 10003

PG Procter and Gamble Education
Street, Cincinnati, Ohio

RIOC Richfield Oil Company, Post
Station, Los Angeles, Cal

SCS Soil Conservation Service,
Box 11222, Forth Worth,

SF Stanton Films, 7934 Santa Mo
California 90046

SOC Shell Oil Company, 50 W. 50t
10020

SVE Society for Visual Education
Chicago, Illinois 60614

FILM AND FILMSTRIP SOURCES

urbank, California

roadway, New York,

Science, 2000 P Street,
06

erial, 347 Madison

Company, Information
York, N. Y. 10007

lic Health Service,

ving Park Road, Chicago,

levard, Los Angeles,

Street, Chicago,

e Street, Philadelphia,

Inc., 1150 Wilmette
091

enue, Jamaica, New York,

South, New York, N. Y.

. Michigan Avenue,

IU Indiana University, Audio-Visual Center, Bloomington,
Indiana 47405

Jam Jam Handy, 2821 Grand Boulevard, Detroit, Michigan 48211

JF Journal Films, 909 W. Diversey Parkway, Chicago,
Illinois 60610

KA Kaiser Steel Corporation, 300 Lakeside Drive, Oakland,
California 94612

Life Life Magazine, Filmstrip Division, 9 Rockefeller Plaza,
New York, N. Y. 10020

McG McGraw-Hill Text Films, 330 W. 42nd Street, New York,
N. Y. 10018

MIS Moody Institute of Science, 12000 East Washington
Boulevard, Whittier, California 90606

NFBC National Film Board of Canada, 680 Fifth Avenue,
New York, N. Y. 10019

PIC Pictura Films Corporation, 29 East 10th Street,
New York, N. Y. 10003

PG Procter and Gamble Education Department, 301 East 6th
Street, Cincinnati, Ohio 45202

RIOC Richfield Oil Company, Post Office Box 75007, Stanford
Station, Los Angeles, California 90005

SCS Soil Conservation Service, Motion Picture Library,
Box 11222, Forth Worth, Texas 76110

SF Stanton Films, 7934 Santa Monica Boulevard, Los Angeles,
California 90046

SOC Shell Oil Company, 50 W. 50th Street, New York, N. Y.
10020

SVE Society for Visual Education, 1345 Diversey Parkway,
Chicago, Illinois 60614

USAEC	United States Atomic Energy Commission, Division of Public Information, Washington, D. C. 20025
USFS	United States Department of Agriculture, Forest Service, South Building, 12th Street and Independence Avenue, S. W., Washington, D. C. 20250
USPHS	United States Public Health Service, Welfare Bldg., 4th Street and Independence Avenue, S. W., Washington, D. C. 20201
UWF	United World Films, 221 Park Avenue South, New York, N. Y. 10003
WD	Walt Disney Productions, Educational Film Division, 350 S. Buena Vista Avenue, Burbank, California 91503
WSTVTV	WSTV, TV Steubenville, Ohio, 43952
YA	Young American Films, McGraw-Hill, 327 W. 41st Street, New York, N. Y. 10036

FILMS

LEVEL I

A	Air All Around Us, McG
A	Air and What it Does, EBF
EC	Chemical Change, McG
EN	Conserving Our Mineral Resources Today, Cor
EC	Green Plants and Sunlight, EBF
EN	Homes Around the World, UWF
EC	Insects in a Garden, EBF
EC	Lands and Waters of Our Earth, Cor
EN	Let's Build a House, Ch
EC	Let's Watch Plants Grow, Cor
EN	Litterbug, AF
EC	Living and Non-Living Things, Cor
EC	Living Things are Everywhere, EBF
EN	Taking Care of Things, Cor
EC	Tree, The, Ch
EC	Tree is a Living Thing, A, EBF
EC	Vision in the Forest, USDA
EC	We Explore the Field and Meadow, Cor
EC	We Explore the Stream, Cor
EC	Where Does Our Food Come From, Cor
A	Wind and What it Does, EBF
EN	World Full of Homes, A, McG

FILMSTRIPS

EC	Conservation Series from SVE: (for Primary grades) A Picnic for Dick and His Friends Sonny Squirrel and the Pine Trees! Susan and the Forest Fire The Deer and the Haystack The Lamb and the Bluebells The Muddy Raindrops
EC	The Meaning of Conservation, McG

FILMS

LEVEL II - III

A	Air Pollution--Everyone's Business, KA
EN	At Home with Wood, USFS
L	Birth of the Soil, EBF
A	Breathe at Your Own Risk, CDC
EN	Camping: A Key to Conservation, IU
L	Conserving Our Mineral Resources Today, Cor
W	Conserving Our Water Resources Today, Cor
A	Control of Air Pollution, USPHS, CDC
A	Effects of Air Pollution, USPHS, CDC
L,W	Erosion, SCS
EC	From Trees to Lumber, AFPI
W	Great Lakes, The--How They Were Formed, EBF
L	Home for Hoppy: Build Your Own Terrarium, McG
EN	Let's Keep America Beautiful, RIOC
L,E	Life in a Cubic Foot of Soil, Cor
EC	Life in a Drop of Water, Cor
EC	Life in a National Forest, USDA
EC	Life in a Deciduous Forest, IFB
EN	Man's Problem, EBF
EC	Nature's Half Acre, WD
EC	Nitrogen Cycle, UWF
A	Ocean of Air, The, UWF
EN	Our Friend the Atom, WD
L	Our Land--Its Many Faces, SCS
EN	Our Part in Conservation, McG
EC	Plant Life and the Soil, EBF
L	Riches of the Earth, NFBC
E	Silent Killer, USFS
L	Soil and Water Conservation, SCS
A	Sources of Air Pollution, USPHS, CDC
L	Treasures of the Earth, SCS
L	Understanding our Earth--How Its Surface Changes, Cor
EC	Vanishing Birds, PIC
W	Water and What It Does, EBF
W	Water for the Community, Cor
W	Water in the Air, Cenco
L	Wearing Away of the Land, EBF
W	Wise Use of Water Resources, UWF

FILMSTRIPS

EC Animal Homes, McG

EN Conserving Our Resources, Curr

EC Green Plants are Important to Us, Jam

EC,W How to Make an Aquarium, Jam

EC,L How We Get Our Coal, YA

EC,L How We Get Our Gas, YA

EC,L How We Get Our Iron, YA

EC,L How We Get Our Oil, YA

EN Iron, and Steel, EG

L Minerals in our Soil, FH

EC,W Plants and Strange Animals of the Sea, Jam

FILMS

LEVEL III - IV

EC	Adaptations of Plants and Animals, Cor
EC	Adapting to Changes in Nature, JF
W	Around a Big Lake, IFB
EC	Balanced Aquarium, EBF
EC	Carnivorous Plants, MIS
EN	Choosing Your Occupation, Cor
EN	Consumer Protection, EBF
EC	Conservation of Natural Resources, EBF
L	Conserving Our Soil Today, Cor
EN	Crude Oil for Energy, SOC
EC	Desert Insects--A Story of Survival, SF
EC	Ecology, Part IX; Population Ecology, No. 2, AIBS, McG
EC	Energy and Its Transformations, EBF
EC	Energy from the Sun, EBF
L,A	Fallout and Agriculture, USDA
EC	Food and Soil, UWF
EC	Forest Conservation , EBF
W	Fresh Water Pond, EBF
EC	Fungi, EBF
EC	High Arctic Biome, The, NFBC
EC	How Green Plants Make and Use Food, Cor
EN	How to Investigate Vocations, Cor
L,EC	Insect Enemies and Their Control, Cor
EC	Interrelationships for Survival, McG
A	Let's Clear the Air, CDC, WSTVTV
L	Life in a Cubic Foot of Soil, Cor
W	Life in a Pond, Cor
EC	Life in the Deciduous Forest, IFB
EC	Life in the Desert, EBF
EC	Life in the Forest, EBF
EC	Life in the Grasslands, EBF
EC	Life in the Woodlot, McG
EC	Life of the Molds, McG
EC	Limiting Factors, AIBS
EC	Living Forest Series, The USDA
W	Marine Ecology, AIBS
L,W	Microorganisms: Harmful Activities, AIM
EC	Our Mr. Sun, ATAT
EN	Our Part in Conservation, YA
EC	Partnership Among Plants and Animals, Cor
EN	Patterns of Energy Transfer, AIBS
EN	People By the Billions, McG

EC Photosynthesis, EBF

EC Plant-Animal Communities: The Changing Balance of Nature, Cor.

EC Plant Succession, McG

EC Population Ecology, AIBS

W Properties of Water, Cor

L,EC Refining Oil for Energy, SOC

A Sources of Air Pollution, USPHS

EC Succession from Sand Dune to Forest, EBF

EN Wastage of Human Resources, EBF

EC Web of Life Series, The, EBF

EC Why Foods Spoil--Molds, Yeasts, Bacteria, EBF

FILMSTRIPS

EC Animal and Plant Communities, Pond, from series Interdependence on Living Things, McG. Conservation for Today's America Series, SVE.
- Forest Conservation Today
- Land Conservation Today
- Mineral Conservation Today
- Soil Conservation Today
- Water Conservation Today
- Wildlife Conservation Today
- Urban Conservation Today

EC Forest Community Series, The, #094710, 6 color filmstrips, Av. 52 frames.

EC Forests for the Future, McG

EC Giving our Wildlife a Chance. Color, EBF

EC Forests for the Future, McG

EC Giving Our Wildlife a Chance. Color, EBF

EC Interdependence of Living Things. #405590, 6 color filmstrips, frames, McG

EN Land, Products, People, EBF

EN Problems of the Middle East. Atl

EC Symbiosis--Strange Partners in Nature. 1960. Life

L Using Our Minerals Wisely, EBF

W Washday Wonders, PG

EC Web of Life, The, McG

EC What Animals Give Man, McG

ADDITIONAL FILMS AND FILMSTRIPS

SELECTED REFERENCES

SYMBOLS FOR BOOKS AND PERIODICALS

A	AIR
C	CONSERVATION
EC	ECOLOGY
EN	ENVIRONMENT
G	GENERAL
L	LAND
PE	PESTICIDES
POP	POPULATION
SW	SOLID WASTE
UR	URBAN PROBLEMS
W	WATER

BOOKS - ADULT

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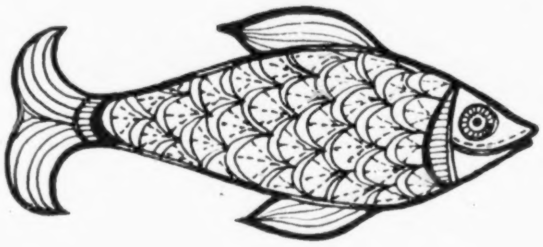

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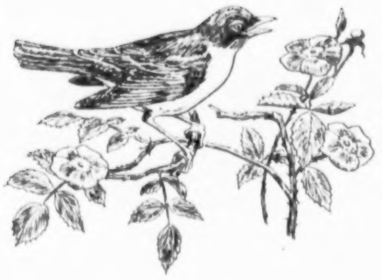

AGENCIES, ORGANIZATIONS, INSTITUTIONS WITH ECOLOGICAL CONCERNS

NOTES

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American Association of
University Women
2410 Virginia Avenue, N. W.
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American Cancer Society
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American Chemical Society
1155 Sixteenth Street, N. W.
Washington, D. C. 20036

American Forestry Association
919 17th Street, N. W.
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American Geological Institute
2201 M Street, N. W.
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American Industrial Arts Assoc.
1201 Sixteenth Street
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American Institute of Architects
1735 Massachusetts Avenue, N. W.
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American Institute of Biological
Sciences
3900 Wisconsin Avenue, N. W.
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American Society for Engineering
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Association of Classroom Teachers, NEA
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California Air Resources Board
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Sacramento, California 95814

California Anti-Litter League
350 Sansom Street
San Francisco, California 94104

California Conservation Council
2604 East Villa Street
Pasadena, California 91107

California Department of Fish and Game
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California Roadside Council
2636 Ocean Avenue
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Campfire Girls, Incorporated
65 Worth Street
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Citizens Against the Sonic Boom
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Citizens Committee on Natural Resources
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Citizens for a Quieter City, Inc.
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Clean Air Council
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Conservation Directory 1971
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Federal Aids Information Service
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1701 18th Street, N. W.
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48 Jackson Place, N. W.
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1050 Mills Tower
San Francisco, California 94104

Smoking Research/San Diego
440 Upas Street
San Diego, California 92103

Sport Fishing Institute
Suite 503
719 13th Street, N. W.
Washington, D. C. 20025

Stamp Out Smog
3334 Bonnie Hill Drive
Hollywood, California 90028

State Conservation of Fish and Game Departments
(located in each state capitol)

State Department of Agriculture
1220 N. Street
Sacramento, California 95814

State Department of Education
(located in each state capitol)

State of California Department
of Public Health
2151 Berkeley Way
Berkeley, California 94704

State Water Resources Control Board
1416 Ninth Street
Sacramento, California 95814

Tuberculosis and Health Association
of San Diego County
3861 Front Street
San Diego, California 92103

U. S. Department of Agriculture
Forest Service
Washington, D. C. 20025

U. S. Department of Agriculture
Soil Conservation Service
Washington, D. C. 20250

U. S. Department of Health, Education
and Welfare
Office of Education
400 Maryland Avenue, S. W.
Washington, D. C. 20201

U. S. Department of Interior
Bureau of Land Management
2800 Cottage Way
Sacramento, California 95825

U. S. Department of Interior
Bureau of Reclamation
Regional Office, Region 2
2800 Cottage Way
Sacramento, California 95825

U. S. Forest Service
630 Sansome
San Francisco, California 94111

U. S. Government Printing Office
Superintendent of Documents
Washington, D. C. 20402

U. S. Public Health Service
Federal Bldg.
50 Fulton Street
San Francisco, California 94102

Wilderness Society
729 15th Street, N. W.
Washington, D. C. 20005

Wildlife Management Institute
709 Wire Building
Washington, D. C. 20005

The Wildlife Society
729 15th Street
Washington, D. C. 20003

World Wildlife Fund
U. S. Office
Suite 728
910 77th Street, N. W.
Washington, D. C. 20007

Zero Population Growth
330 Second Street
Los Altos, California 94022

ADDITIONAL AGENCIES, ORGANIZATIONS, INSTITUTIONS, ETC., WITH ECOLOGICAL CONCERNS

ADDITIONAL SUGGESTIONS

NOTES

WHEN NO MULTI-MEDIA IS READILY AVAILABLE

Because environmental or ecological audio-visual and multi-media materials may not be readily available in each district the following suggestions for approaching any subject with an environmental or ecological point of view are given.

ENVIRONMENTAL EDUCATION LESSON

- by Julianna Hamann

Given any topic or phenomena:
(books, trees, fences, plastic products, burning trash, mini-bikes, record-playing, littering streets, dancing, etc.)

1. Give its ecological characteristics.
   - Have the students describe its shape, size, structure ingredients and/or its physical features.
   - Trace back to its original natural state or its resource. In the case of a phenomena--its cause or origin.

2. Give its present relationship to the environment (inter-relationship).
   - Name the function, purpose and/or its action.
   - Describe how it is dependent on its environment or how its environment is dependent on it. (interdependency)

3. Give its present status.
   - Name its polluting quality, if any.
   - Name its pressure on natural resources, if any.
   - Name its de-polluting quality, if any.
   - Name its usefulness or benefits, if any.
   - Name its enhancing or depriving behavior, if any.

4. Give reasons for choices made about this topic or phenomena.
   - Who selected, orginated or invented it?
   - Why was it made or caused?
   - What alternatives were available for the job to be done?

5. Give alternate ways this topic or phenomena can operate.
   - Can it be recycled?
   - Can it be reused for another purpose?
   - Can the phenomena be reversed or averted?
   - Can the behavior change?

6. List values connected with this topic or phenomena.
   - Why do we perpetuate the topic or phenomena?
   - Who makes the decisions?
   - How can our voices and opinions be heard?
   - In what ways do we behave which reflects our opinion, judgment and values about this topic or phenomena?
   - Are we ready to accept responsibility for it?

7. Give ways our future will be enhanced, changed, or destroyed by the perpetuation of this topic or phenomena.

With these seven steps in mind, any film, film-strip, chart, story or activity can be turned into a conservation, environmental or ecological lesson.

SPECIAL ACTIVITIES

Field Trips

Look at the organizations or agencies listed in the appendix. Select one, then check the telephone directory for finding a local group. Each community will differ as to the number represented and as to whether permission to visit it with a class is granted. Generally, any field trip taken can have an environmental or ecological aspect woven into it. See the section on "When no multi-media materials are readily available" for suggestions.

Bulletin Boards - by Julianna Hamann

A change in words of emphasis of regular bulletin board ideas will quickly convert into an environmental bulletin board. Adding a question mark to "America the Beautiful?" will imply pollution ideas.

Increasing the quantity of materials being studied on one board will imply population pressure, over-crowding, or litter.

Comparison of sights or scenery in any social studies topic will convey the idea of present or past conditions and future possibilities. Titles might be "This or this?", "Today--Tomorrow?", "Choices, this or that?", "Ours--theirs".

Ideas which show circular motion indicate interrelationship and interdependency.

Slogans highlight ideas--"Give a Hoot, Don't Pollute", "For Heanven's Sake, Don't Pollute Our Lake", "Be an Eager Beaver not a Litter Leaver"--with appropriate animal pictures.

Series of "What is ___________?" air pollution, water problems, etc.

Using the eight human value categories, with pictures representing enhancement of deprivation of the environment can be taken in total or separate one month at a time. Wealth, enlightenment, affection, skill, power (decisions), well-being, respect, responsibility.

Use children's suggestions on "what we can do", "this we believe", "our opinions".

Additional Activities

Teachers can encourage innovation and creativity in having the children express their ideas.

Suggest culminating activities with any lesson:

- posters
- cartoons
- songs
- slogans
- badges
- murals
- puppetry
- scrapbooks
- stories
- skits
- bulletin boards
- debates
- discussions
- photography
- experiments
- art media
- newspapers

HOW TO WRITE TO YOUR CONGRESSMAN

(Selected ideas from Clean Air Council)

When you have studied an environmental issue and gathered data to support your stand, write to your Senators and Congressman stating your facts, concerns and your requests. Ask for his stand on the issue and what, if any, action he has taken. Be patient and courteous and give ample time for a reply. Every letter is read and counted but he may be tallying opinions of his constituents before action is taken

For effective letter writing note the following suggestions:

1. Know the names of your United States Senators and Representatives and your California Senators and Assemblymen. (Call Registrars Office.)
2. Address them as "Dear Senator _________" or "Dear Congressman ___________".
3. Identify yourself--name, address and personal interest in the issue. If possible refer to the Bill Number.
4. State whether you are for or against the environmental issue.
5. You might ask that your views be presented to members of the appropriate committee handling the legislation.
6. Ask them about their personal views on the matter.
7. Write as a private citizen not as a member of an organization.

ADDRESSES

1. California

Governor:
Honorable Ronald Reagan
Governors Office
State Capitol Building
Sacramento, California 95814

Senator:
Honorable Clair W. Burgener
Senate
State Capitol Building
Sacramento, California 95814

Assembly:
Honorable Pete Wilson
Assembly
State Capitol Building
Sacramento, California 95814

2. United States

Department of Health, Education and Welfare:

Robert Finch, Secretary
Department of Health, Education
and Welfare
Washington, D. C. 20201

President of the United States:

Richard M. Nixon, President
United States of America
The White House
Washington, D. C. 20500

U. S. Senators:

George Murphy
Senate Office Bldg.
Washington, D. C.
20510

(when not in session)
14223 Federal Bldg.
11000 Wilshire Blvd.
Los Angeles, CA 90024

Alan Cranston
Senate Office Bldg.
Washington, D. C.
20510

(when not in session)
13220 Federal Bldg.
11000 Wilshire Blvd.
Los Angeles, CA 90024

Representatives in U. S. Congress:

Lionel Van Deerlin
House Office Bldg.
Washington, D. C.
20510

(when not in session)
815 "E" Street
San Diego, CA 92101

Bob Wilson
House Office Bldg.
Washington, D. C.
20510

(when not in session)
815 "E" Street
San Diego, CA 92101

GAMES, KITS, PAMPHLETS

The educational market is being flooded at present with a wide range of simulated games, ecological kits and environmental activities. The major periodicals such as Instructor, Grade Teacher and many others, are displaying new materials monthly. Because it is impossible to preview and judge them at this time we have purposely left them off any suggested list. It is our recommendation that before purchases are made that the environmental performance objectives and concepts be kept in mind as there may be redundant or inappropriate material among the very fine ones being prepared.

NAME YOUR POISON

Donald Dahlsten, in his book, Pesticides, includes an article called "Name Your Poison". We feel it necessary to reprint his information as relevant material for understanding environmental pollution.

Synthetic organic insecticides are generally classified into three broad groups, the chlorinated hydrocarbons, organophosphates and carbamates. Within each group there is a great variation in toxicity to different animals as well as a difference in their ability to persist in the environment.

Acute toxicity, the most direct hazard to man, is evaluated by determing the amount of a compound it takes to kill fifty percent of an experimental population of white rats. It is usually abbreviated as LD_{50}. This is only a comparative value, however, and tells very little about the compound. For example, TEPP is one of the most toxic chemicals registered as a pesticide, yet it can be used on a crop twenty-four hours before it is harvested with no danger of leaving a detectable residue. On the other hand, DDT is far less toxic but remains in the environment for years and accumulates to damaging levels in food chains. Other peculiarities exist among some compounds. Carbaryl, a carbamate, has a relatively low toxicity for mammals but is a deadly killer of honeybees and related insects, far more so than its relative Zectran which in turn is more deadly to mammals.

All groups have two things in common. First, they are highly soluble in fatty tissues. Because they should kill insects on contact they must be able to penetrate the thin layer of hard fatty material that covers the body of insects. This feature accounts for the fact that the persistent materials can build up in fatty tissues of many kinds of animals.

Secondly, they kill by disrupting the transmission of nerve impulses. The method by which the organophosphates and carbamates accomplish this is quite well understood. They change the structure of a chemical generated at nerve junctions. The change allows the repetitive firing of the nerve and results in convulsions and death. The chlorinated hydrocarbons also attack the nervous system, but the precise mode of action is not fully understood.

There are over 100 commonly used insecticides and about 1,000 different formulations. They are used as dusts, sprays, aerosols, granules, pellets and baits. They are sometimes fed to animals to control parasites. They are incorporated into many consumer products, including paints, clothes, floor waxes, wood products and room deodorizers, to name just a few. In short, it is impossible to avoid contact with a wide variety of insecticides.

The following table contains a few of the most widely used chemicals and their relative toxicities:

	LD_{50} milligrams per kilogram (white rats)	LC_{50} at 11° C. milligrams per liter (fish)
Chlorinated Hydrocarbons		
Aldrin	40.0	.0082
Dieldrin	46.0	.0055
DDT	250.0	.005
Endrin	12.0	.0044
Heptachlor	90.0	--
Lindane	125.0	*n.e. at .03
Toxaphene	69.0	.0022
Endosulfan	110.0	--
Telodrin	4.8	--
Organophosphates		
Malathion	1500.0	.55
Parathion	8.0	.065
Methyl parathion	15.0	**ir at 1.0
Azinphosmethyl	15-25	.055
TEPP	1.6	--
Mevinphos	6.0	.83
Ethion	208.0	.42
Temik	1.0	--
Trichlorphon	450.0	*n.e. at 1.0
Carbamates		
Carbaryl	540.0	--
Zectran	15-36	*n.e. at 1.0

*no effect
**irritated
LD_{50}--lethal dose for 50% of experimetal population
LC_{50}--lethal concentration for 50% of experimental population

GLOSSARY

GLOSSARY

Abiotic - a non-living element in a given ecosystem.

Adaptation - adjustment to environmental conditions.

Absorbent - a substance which will collect gaseous materials; used for the collection of pollutants.

Aerosol - a very small particle that will remain suspended in the air; can be either solid or liquid.

Air - the normal gas envelope of the earth: 78% nitrogen (N); 21% oxygen (O); and less than 1% of carbon dioxide (CO_2); inert gases and water vapor.

Allotrope - a form of an element that differs in physical or chemical properties from another form. Oxygen (O) has allotropic forms in ozone (O_3) and molecular oxygen (O_2).

Asthma - the congestion of the respiration system involving the narrowing of the bronchioles, evidenced by wheezing and breathing difficulty.

Attrition - bearing down of a material by friction.

Autotroph - an organism which synthesizes its food from inorganic substances.

Balance in nature - tendency of living things to maintain a dynamic equilibrium between themselves and their environment.

Biodegradable - a material that can be broken down into simplier materials by natural biologic processes.

Biological magnification - a buildup or concentration of dangerous chemicals as lower level consumers are eaten up by upper level consumers.

Biome - a regional category of related ecosystems, i.e., tundra rain forest with somewhat uniform climate.

Biosphere - the portion of the earth, soil, air, and water, whose components are the living population of plants, animals and microbes.

Biotic - the living elements in a given ecosystem.

Bronchiole - small branch of the bronchus in the human lung.

Bronchus - the major pathway of air to the lungs.

Carbon monoxide - a very toxic, odorless, and colorless gas that results from the incomplete combustion or burning of material that contains carbon (CO).

Carcinogenic - cancer producing material.

Carnivore - the animal population which feeds on other animals or organisms.

Carrying capacity - the number of organisms an ecosystem can support.

Catalyst - a compound that speeds up a chemical reaction.

Chromosome - the part of a cell that transfers inherited characteristics to the next generation of cells.

Chronic - a disease that has a long duration, may be severe or slight, and can recur at intervals.

Climate - average of weather conditions over a long period of time in a large geographical area, as determined by air pressure, heat, wind and moisture.

Climax community - a community is stabilized and there is no further ecological succession.

Coh - abbreviation for coefficient of haze, a measurement of the interference of visibility.

Combustion - burning of fuel in the presence of oxygen.

Commensalism - a one-sided relationship whereby two organisms live together with only one deriving benefit, but with little or no harm inflicted on the other.

Community - a group of plants and animals that live together.

Consumer - the animal populations which remove or use up the portion of organic production of the producer.

Convection - updraft of warmer air, rising because it is lighter than the surrounding air.

Decibel - the usual unit for measuring the relative loudness of sounds; the human ear can detect a range of about 130 decibels. (Abbrev. Db)

Decomposer - the reducers of organic production of the consumer population who recycles back into the system the nutrients necessary for the growth of the producers by breaking down tissues and and excretions of other organisms to simplier forms.

Ecological niche - the totality of biotic and abiotic factors to which a given species is exposed.

Ecological succession - one community replaces another in an orderly and predictable sequence.

Ecology - the study of the interrelationships between organisms and their environment; the structure and function of nature.

Ecosphere - the components - the atmosphere, oxygen, carbon dioxide, water vapor and other gases and suspended particles of the air together with various geological chemical and physical features of sea and land which comprise the totality of habitats.

Ecosystem - the functioning of the groups of all the plants, animals and non-living environment as a single unit.

Effluent - outflowing into the environment.

Emmission factor - the average amount of a particular pollutant that is emitted from each source in relation to the total population.

Emission standard - the maximum amount of pollutant that is permitted from a source.

Emphysema - a breakdown of the alveoli in the lungs. The alveoli are the smallest divisions of the lung where oxygen and carbon dioxide transfer occur.

Environment - the sum of all physical, chemical, and biological factors to which an organism is subjected.

Environmental resistance - the limitation of the numbers of a population by external forces or the carrying capacity of its natural community.

Eutrophication - aging process in lakes, due to increase in the amounts of nutrients present, which usually occurs over a period of hundreds, thousands, or millions of years. This process has been greatly speeded up by man's utilization of bodies of water for waste disposal.

Flouride - a compound containing flourine; can be gaseous or solid. Flourides are particularly damaging to vegetation.

Food chain - a chain of organisms existing in any natural community such that each link in the chain fe feeds on the one below and is eaten by the one assimilated into bodies of one or more animals; excretion, burning and bacterial and fungal action on dead organisms return nitrogen atoms to inorganic state.

Nitrogen oxides - gaseous compounds contain nitrogen (N) and oxygen (O), produced when combustion takes place under high temperature and pressure; a major damaging air pollutant.

Omnivore - the animal population which feeds on both green plants and other organisms.

Organic - pertaining to organisms or living things generally, to compounds formed by living organisms, and to the chemistry of compounds containing carbon.

Organism - any individual living creature, either unicellular or multicellular.

Oxidant - a substance which contains oxygen or reacts chemically to form new substances in the air or on land surfaces.

Ozone - a toxic form of oxygen (O_3).

Parasite chain - a plant or animal which attaches itself to another living thing called its "host".

PBC - polycholorinated biphenyls; versatile chemicals used in synthetic rubber, floor tile, ink, brake linings, paints, asphalt, adhesives, resinsand plastics that are released into the environment when the products are made or when the products are oxidized or burned as refuse. PCB's are known to be instrumental in causing hormonal imbalance and skin and liver damage.

Pesticide - poisons or chemicals which remove or kill unwanted plants and animals (herbicide, insecticide, fungicide, rodenticide).

PH - a measure of the acidity or alkalinity of a material; a reading of 7 indicates neutrality, 14 strong basicity, 9 strong acidity.

Photochemical process - changes in a substance that result from the reaction with sunlight.

Phytoplankton - aquatic free-floating microscopic plant life; photosynthesis in these organisms is retarded by the presence of DDT in the ocean.

Photosynthesis - the process by which simple carbohydrates are manufactured from carbon dioxide (CO_2) and water by chlorophyll-containing cells, using light as an energy source and releasing oxygen as a side product.

Pioneer community - the earliest stages of an ecological succession.

Pollution - there are two types: (1) an excess of some fairly ordinary substance--smoke or solid waste--which cannot be absorbed or transmuted rapidly enough to offset its introduction into the environment. All organisms have wastes and by products, and these are part of the total biosphere; when these accumulate in excess of what can be naturally broken down and recycled, pollution occurs; (2) the introduction of powerful chemicals and poisons, products of recent technology, which the biosphere cannot cope with without damage to life and life-support systems. The long range effects are unknown.

Population - group of plants or animals of the same kind that live in one place at one time.

PPM - parts per million. The number of parts of a given substance in a million parts of air (or water).

Predator chain - energy is transferred from the plant to the plant-eater and on to the carnivore, who receives energy from the sun third hand.

Producers - the green plants in the food chain which utilize radiant solar energy through photosynthesis.

Reciprocating engine - an engine which uses (explosive) power to drive a piston which turns a crankshaft. The typical auto and airplane engine is a reciprocating above; plants, bacteria and other scavenging forms are on the bottom and the largest carnivores at the top.

Food pyramid - representation of a food chain, illustrating the ratio of food producers to varying levels of food consumers.

Food web - a multiple food chain.

Fossil fuel - materials used in combustion in which energy has been stored throughout the ages (e.g. - coal, oil, gas)

Greenhouse effect - short wave light energy from the sun enters the lower atmosphere; the energy reradiated from the ground is long wave heat energy which cannot pass through humid or cloudy air, and causes a temperature rise in the lower atmosphere.

Habitat - where a plant or animal lives, finds food and shelter and raises its young.

Herbicide - poisons which kill unwanted plant life.

Herbivore - the animal population which eat green plants but not other animals.

Heterotroph - an organism which obtains its organic food from other organisms.

Holocoenotic - the principle that there are no barriers between the environment and the organism or biotic community; if a single organism in nature or factor is affected, the rest of the ecosystem is affected.

Homeostasis - the steady balancing state in an ecosystem.

Hydrocarbon - compounds containing hydrogen (H) and carbon (C). The chlorinated hydrocarbons are known for their toxicity, stability, and wide-occurrence as environmental pollutants (pesticides.)

Hydrologic cycle - the earth-air cycle of precipitation, runoff, evapotranspiration; or the water cycle, whereby water is in continual circulation in the biosphere.

Insecticide - poisons which kill unwanted animal life. (See end of resource guide for names).

Interrelationship - the interaction between plants and animals and their environment.

Inversion layer - warm air overlying colder air so that the layer of colder air cannot rise; thus any air pollutants in the lower level will be trapped beneath the layer of warmer air.

Isotope - two or more different kinds of atoms of the same element with different atomic masses; often isotopes are distinguishable by radioactive differences or the number of neutrons in the nucleus.

Limiting factor - environmental factor limiting the growth or reproduction of an individual or a community; the requirement of life (i.e., food that is in short supply.)

Megalopolis - great expanses of city.

Micro - 1 millionth (1/1,000,000) of any measurement.

Micron - 1 millionth of a meter.

Milli - 1 thousandth of any measurement.

Mutualism - the existence of two organisms living together to the advantage of each one.

Niche - the particular location of a plant or animal where it prefers to make its home.

Nitrogen cycle - worldwide circulation and revitalization of nitrogen atoms, chiefly due to metabolic processes of plants and animals; plants take up inorganic nitrogen, convert it into organic compounds (proteins) which are engine.

Recycle - the concept of re-use of materials and reutilization of products that are biodegradable and not harmful or even useful to the environment (composting, natural fertilizers); that can be broken into basic components and then used in new products (recycling aluminum cans, paper). Everything in nature is part of a cycle.

Respiration (external) - the intake of oxygen and the liberation of carbon dioxide.

Respiration (internal) - the oxidative breakdown and release of energy from fuel molecules by reaction with oxygen; occurs on a cellular level in the body.

Ringelmann chart - a series of charts from 0 to 5 used to measure the capacity of smoke.

Saprobes - microbial populations specifically related to some particular reaction in the total organic decomposition.

Saprophyte chain - the energy from the sun is transferred from dead plants and animals to microorganisms.

Smog - the result of photochemical recombination of carbon monoxide, ozone and oxides of nitrogen, with additional particulate matter, forming an irritant capable of damaging plant and animal life.

Spirometer - an instrument to measure air flow in and out of the lungs.

SST - the supersonic transport which would fly at 1800 m.p.h., creating shock waves (sonic booms) in a 50-mile-wide area below the planes flight path. Sonic booms cause physical damage to property, and physiological and psychological damage to humans. The SST will also contribute vast amounts of carbon dioxide and water vapor into the atmosphere above the level of effective wind circulation, with possible weather changes as a result.

Succession - process involving the change of communities of plants and animals in an area.

Sulfur oxide - a toxic gas formed by combustion of oil or gasoline derivatives; toxic to plant and animal life.

Thermal pollution - the return to source streams or the ocean of water used to cool power plants and some industries; can increase the temperatures from 10 to 30 degrees F. above normal temperatures. Heat reduces water's capacity to hold oxygen.

Trophic level - the consumer level of the food chain in an ecosystem.

Turbine - an engine which derives power from a wheel turned at high speeds by gas directed at the curved blades of the wheel.

Vaporization - diffused matter suspended in the air (vapor) which is the result of spraying or heating, such as steam from water.

Viability - the ability to live.

Volatile - evaporated easily.

Waste treatment - three processes: (1) primary treatment, which is a mechanical process, removes solids which will float or settle out of water (sedimentation): (2) secondary treatment, which destroys organic matter which can be decomposed through biological processes; (3) tertiary treatment, which includes chemical treatment involving sedimentation, filtration, and absorption; electrodialysis may be used to reduce the number of dissolved salts.